AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

JULY 15, 1957

In This Issue

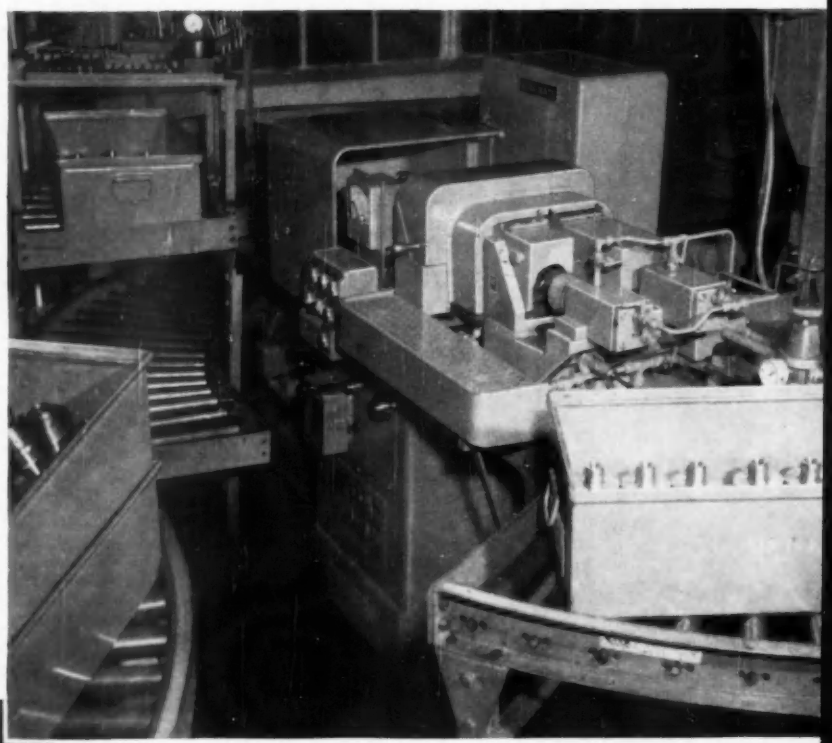
A CHILTON PUBLICATION

GUN DRILLING on a Bore-Matic gives

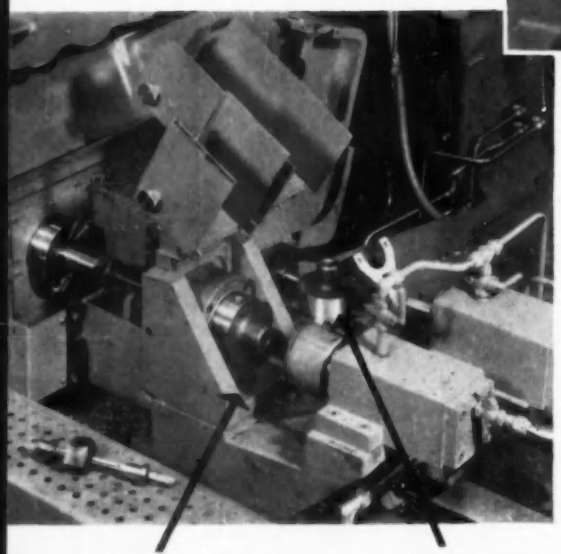
SURE-FIRE PRODUCTION

with

- higher precision
- better finish
- easier operation
- less maintenance
- lower costs



Model 121 Bore-Matic equipped for gun drilling is positioned in a conveyorized production line. Left foreground conveyor brings work to operator and lower background conveyor takes it to intermediate operations. Right foreground conveyor returns work for second gun drilling and upper background conveyor takes pieces away.



FRONT STATION—Gun drill plunger hole from solid. Coolant is confined inside part, after drill breaks through, by Neoprene tip on hydraulic clamping head.

REAR STATION—Gun drill port hole from solid. Holes are plugged to confine pressure (750 psi) coolant inside work after drill breaks through.

THE PRECISION and speed of a Bore-Matic make it a natural for gun drilling. For example, the two-station Model 121 shown here was fitted with adapters to hold the gun drills on the boringhead spindles and with hydraulic clamping heads mounted on the table for the mating bushings. It replaced a two-spindle gun drilling machine for handling the plunger and port holes in Nitralloy hydraulic heads. Here are the results:

PRODUCTION was increased from 24 to 27 parts per hour for plunger hole. Port hole production — previously done on drill press with final location by subsequent grinding of shoulder — went up to 48 parts per hour with *accurate* location.

TOLERANCES were reduced from .002 to .001. Both holes straight within 20 to 30 millionths.

FINISH was improved from 60 rms to 15 rms; and honing was eliminated.

OPERATIONAL handling time was cut in half.

MAINTENANCE was substantially reduced.

COSTS were cut by 75% over previous method.

Another plus factor was that the closer tolerances resulted in great savings in subsequent operations.

For more information on this and other interesting and profitable set-up possibilities with a Bore-Matic, get in touch with your nearest Heald representative.

IT PAYS TO COME TO HEALD!

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

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FOR SPARKLING, DURABLE PAINT FINISHES

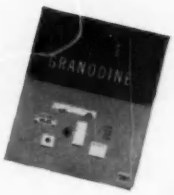
ACP Granodine provides an excellent base for sparkling, durable paint finishes on automotive equipment, home appliances and industrial products by chemically converting steel surfaces to a nonmetallic phosphate coating. It not only greatly increases the adhesion of the finish, but also provides extremely good corrosion resistance even when used in conjunction with a relatively thin and flexible paint film. Granodine coatings are easily and economically applied to steel surfaces by dipping, spraying or brushing.

AN AUTOMOBILE requires a durable paint finish that retains its beauty under all weather conditions—ice and snow, sun and rain. ACP Granodine phosphate coating provides an excellent base for such a finish—greatly increases the adhesion of the paint to the metal.

IN THE HOME, ranges, refrigerators, freezers, washers and dryers are among the many products whose sparkling finish is anchored to the metal by Granodine coating.

IN INDUSTRY, drums, materials handling equipment, machine tools and many other steel products used throughout the plant are protected by a Granodine base.

LEARN ALL ABOUT ACP GRANODINE. Bulletin 1380 describes the various types of ACP Granodine and gives information which will help you select the proper type for your particular application. Write for your copy today.



CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT COMPANY, Ambler 24, Pa.

DETROIT, MICH. • ST. JOSEPH, MO. • NILES, CALIF. • WINDSOR, ONT.

New Chemical Horizons for Industry and Agriculture

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

JULY 15, 1957 — VOL. 117, NO. 2

FEATURES

NEWS PREVIEWS

DEPARTMENTS

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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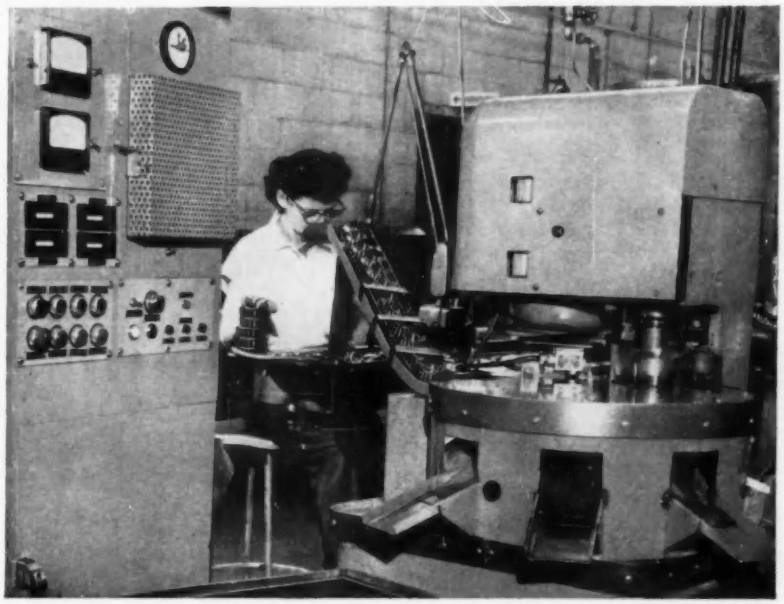
When you think of tapered roller bearings think of HYATT



Automatic electronic noise and torque test machine

—because they're built with ELECTRONIC QUALITY CONTROL!

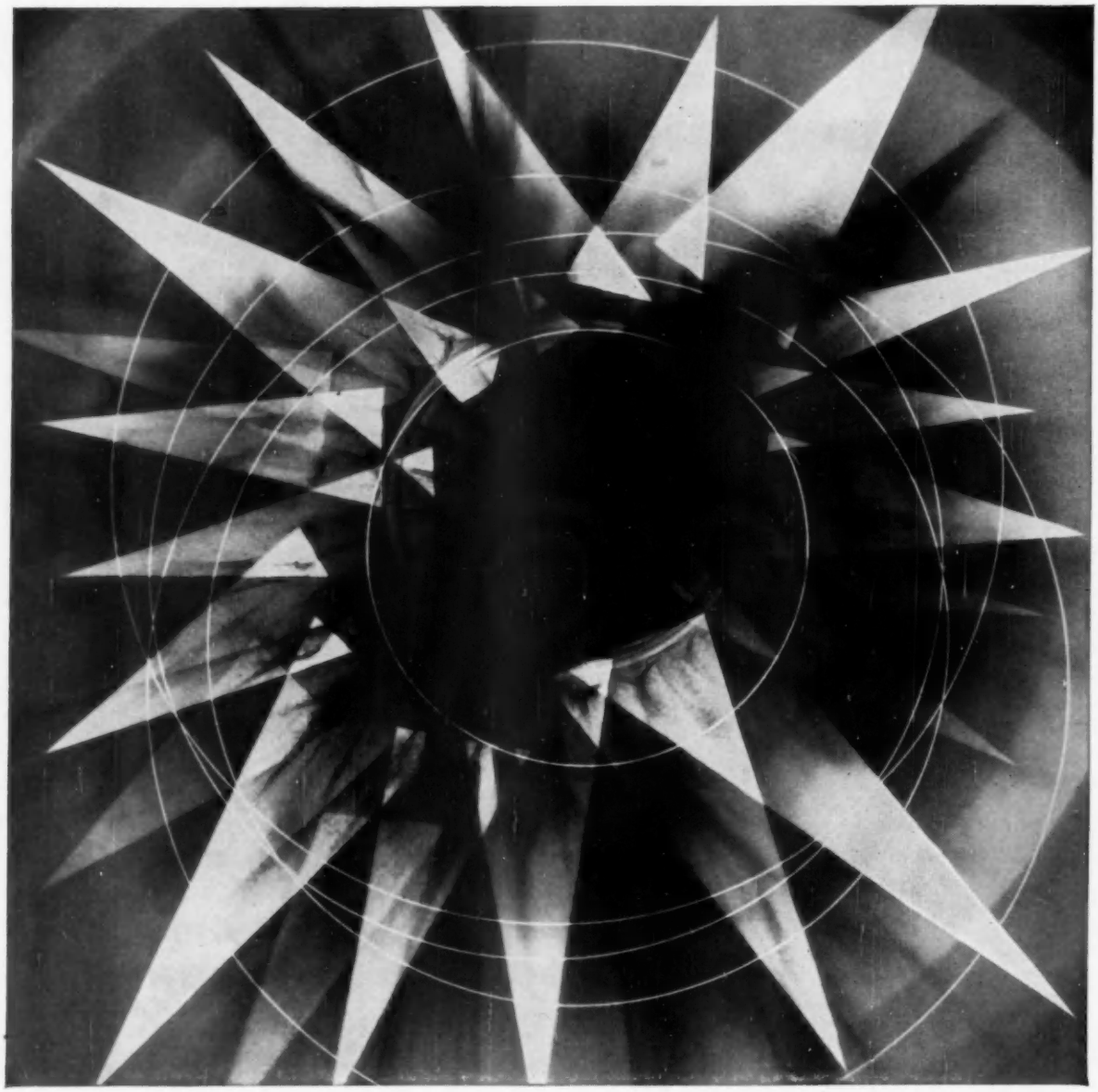
Nearly half of all American cars and trucks built today have HYATT Hy-Roll Tapered Bearings

The photo above shows something *new and important* to every user of tapered roller bearings. At HYATT'S plant in Clark Township, New Jersey, batteries of electronic controls like this are helping HYATT craftsmen turn out tapered bearings with *greater uniformity than ever before achieved in quantity production.*

HYATT'S new standards of *electronic quality control* mean longer, smoother, more dependable performance than any tapered bearings —even HYATTS—have ever given you in the past. If you want the *best*, you want HYATT Hy-Roll Tapered Bearings! Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

GM GENERAL MOTORS

HYATT HY-ROLL BEARINGS FOR CARS AND TRUCKS



breaking the barriers
with Utica Vacuum Metals

Today's challenge lies in developing *metals* and *means* of cracking the thermal barrier.

The metals problem has already been partially solved by superalloys produced through Vacuum Melting. This process, as developed by Utica, has yielded such super refractory alloys as Udimet 500—a clean, pure alloy combining unsurpassed stress-rupture life with superior high tensile strength in the 1200° F to 1800° F range. *At 1600° F, Udimet 500 has a tensile strength of over 100,000 PSI.*

In addition to making new superalloys, Utica Metals Division of Kelsey-Hayes upgrades existing alloys through vacuum melting.

Kelsey-Hayes Co., Detroit 32, Michigan.

VACUUM MELTING
provides these properties

- *High temperature corrosion resistance*
- *Increased ductility*
- *Extreme cleanliness*
- *Precise chemical control*
- *Longer stress-rupture life*
- *Increased tensile strength*
- *Better fatigue resistance*
- *Greater yield strength*
- *Greater impact resistance*
- *Greater creep properties*

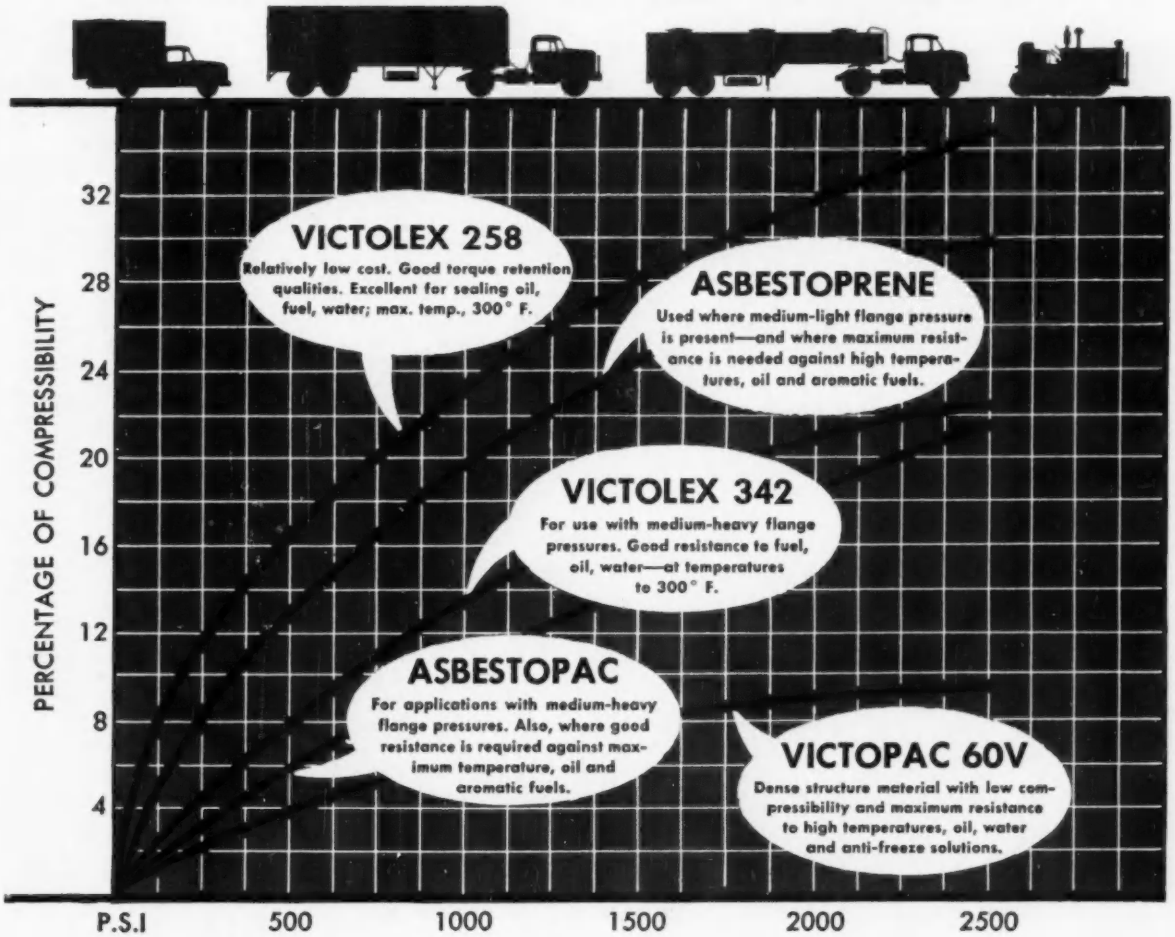
KELSEY-HAYES

Aviation, Automotive and Agricultural Parts • Hand Tools for Industry and Home.

15 PLANTS / Detroit and Jackson, Michigan; McKeesport, Pennsylvania; Los Angeles, California; Windsor, Ontario, Canada Springfield, Ohio — 2 plants — (SPECO Aviation Division) • Utica, New York — 4 plants — (Utica Drop Forge and Tool Division) Davenport, Iowa (French & Hecht Farm Implement and Wheel Division)

VICTOR

"Soft" PACKINGS FOR HEAVY-DUTY INDUSTRIES



Full range of synthetic packings

The five Victor "soft" packings plotted on the comparative compressibility chart answer many problems for automotive sealing engineers. Each packing is made of the best materials for coping with problems inherent in specific applications. Each has the right density and degree of compressibility to meet varying flange pressures, temperatures and the penetration of water, oils and other fluids. Each packing conforms to SAE-ASTM specifications.

Complete technical information about these packings and their uses is available from your Victor Field Engineer. If you do not know where to reach him, write Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90, Ill.

VICTOR

Sealing Products *Exclusively*

GASKETS • OIL SEALS • PACKINGS

(ac) puts the (ac) cent on service

When a carburetor intake silencer problem couldn't be brought to AC, we sent a laboratory on wheels to the customer.

Here's a prime example of AC interest in service to you. We have made it possible for AC engineers to work with *your* engineers right at your plant, make an on-the-premises acoustical analysis and tailor-make a pilot model intake silencer for your new engine.

The AC Mobile Laboratory was conceived to lick the all-important time problem. It can now do in days a job that formerly required months. The rolling "lab" is complete with machine shop, acoustical instruments, power tools, sheet metal working equipment, tape recorder and playback to do the job on the spot. Contact one of the AC offices listed below.

This is one in a continuing series of FACTUAL SERVICE STORIES proving that you can depend on AC for the facilities, the experience, the manpower and the desire to work with you in the solution of ordinary and extraordinary problems.

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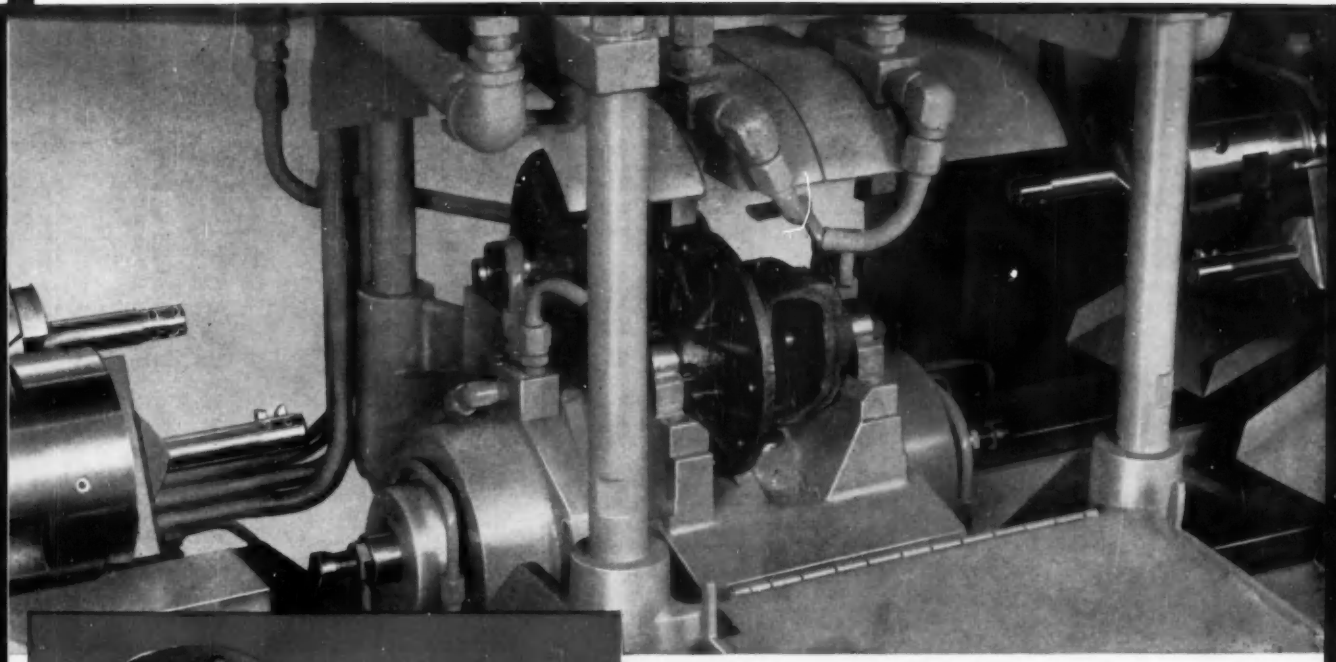
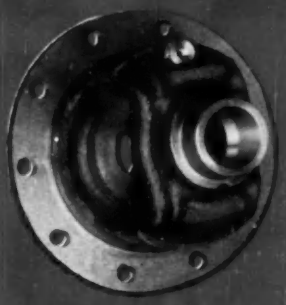
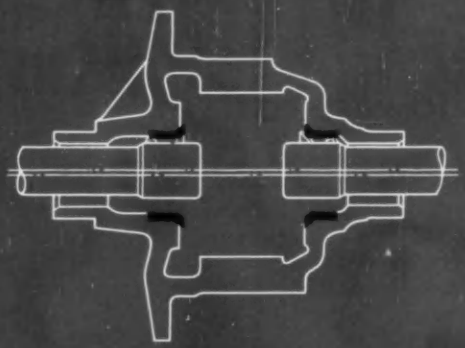
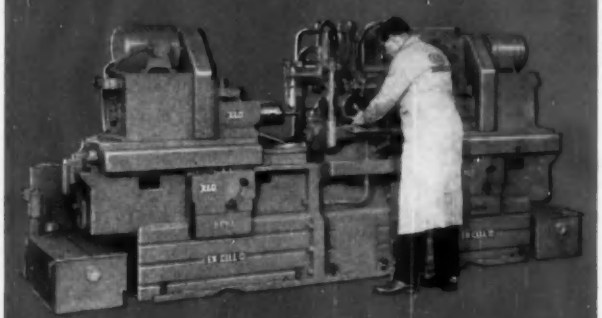




Above, close-up of parts in fixture. Overhead air clamps in position for loading and unloading. Part shown at left.



Internal boring and chamfering cuts indicated by black lines. Tolerances are held to ± .0005".



Ex-Cell-O Two-Way Precision Boring Machine ups production, increases accuracy.

XLO EX-CELL-O FOR PRECISION

Increases Production, Keeps Accuracy

Back-bores and Chamfers Differential Cases

If you want to increase production, yet maintain .0005" accuracy, get an Ex-Cell-O Two-Way Precision Boring Machine. That's the opinion of an automobile manufacturer.

Right now this machine is performing back-boring and chamfering operations inside steel automotive differential cases for this company. Boring bars enter the case on the center line of the bores, then move 5/32" off center, perform the cutting operations, then withdraw after returning to the center line. Two cases are machined at the same time.

Ex-Cell-O Way Machines perform as one, two, three, and four-way assemblies with exceptional versatility.

These machines adapt smoothly into automated lines, too. See your Ex-Cell-O representative or write Ex-Cell-O, Detroit.

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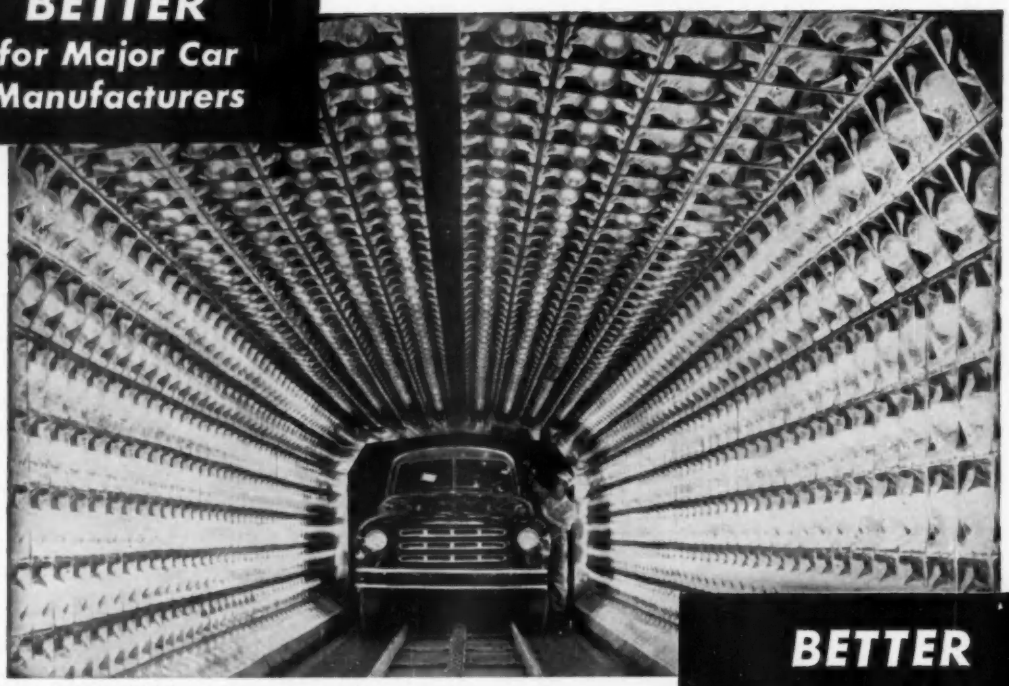
MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

57-24

BETTER
for Major Car Manufacturers



Fostoria Industrial Infrared Ovens are used by every major car manufacturer in more than 300 automotive installations.

BETTER FOR YOU!

In the automotive industry

MILES OF OVENS . . . BY FOSTORIA

give top-quality results . . . *at lowest cost!*

Don't take *our* word for it—look what's been happening in the highly competitive automotive industry. Today, the customer list for FOSTORIA RADIANT OVENS reads like a "Who's Who" among automotive manufacturers. The list of FOSTORIA users includes *all* of the major car and truck manufacturers in this country. It also includes many automotive component part manufacturers and assembly plants overseas. These companies are ordering and *reordering* FOSTORIA Ovens . . . and have been for years! The reason behind FOSTORIA's position of leadership is clear. FOSTORIA is the world's oldest and largest manufacturer of industrial infrared ovens—with unrivalled application "know-how" and experience in engineering *all three major types* of industrial infrared equipment, from components to complete ovens—Quartz Lamp, Radiant Rod and Conventional Infrared Lamp. An experienced FOSTORIA sales engineer is ready to help *you* achieve important savings with FOSTORIA RADIANT OVENS too.

Call him today and take advantage of these specialized services. There's no obligation.

Write for a free copy of "Applications Unlimited," a fact-filled booklet of cost-saving information on Radiant heating.

INFRA-RED fostoria SYSTEM

5810

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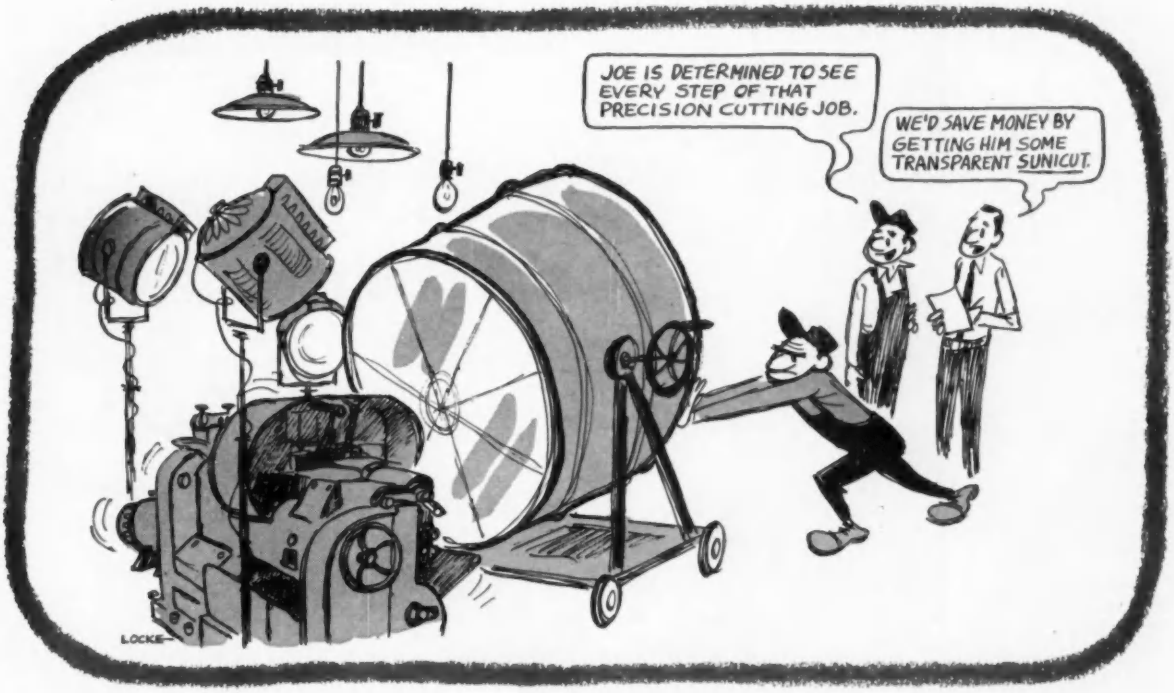
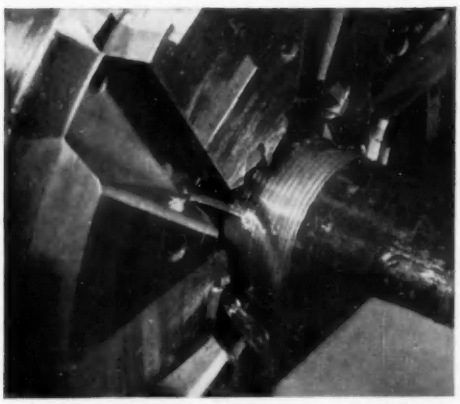


For precision cutting...

TRANSPARENT SUNICUT OILS ASSURE YOU GOOD VISIBILITY, PEAK PRODUCTION



Transparent Sunicut oils assure excellent finish in critical operations at close tolerances. Good visibility speeds production.

Transparent Sunicut® oils, including heavy-duty and dual-purpose oils, are available in many grades to suit your specific needs. They give outstanding results...especially where precision cutting is required.

Their transparency takes the "blinders" from work that needs close watching, permitting close product control, faster production, lower unit cost. Machine operators like Sunicut's "cleanliness." Most important, *transparent Sunicut oils assure you of good finishes.*

For full information about Sunicut cutting oils, call your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-7.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

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- Especially designed to give added reliability for automotive and appliance light sockets (applications where vibration can cause the conductor to ground or break at the connection).
- Replaces all button-type contacts presently in use.
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- Chamfered edges permit easy rotation of bulb when locking into twin contact socket.
- Applied by high speed AMP Automatic machines using the revolutionary Keystone Serrated solderless crimp.
- Available in plain brass, or with tin or silver plating, for wire sizes AWG 20 through 16.

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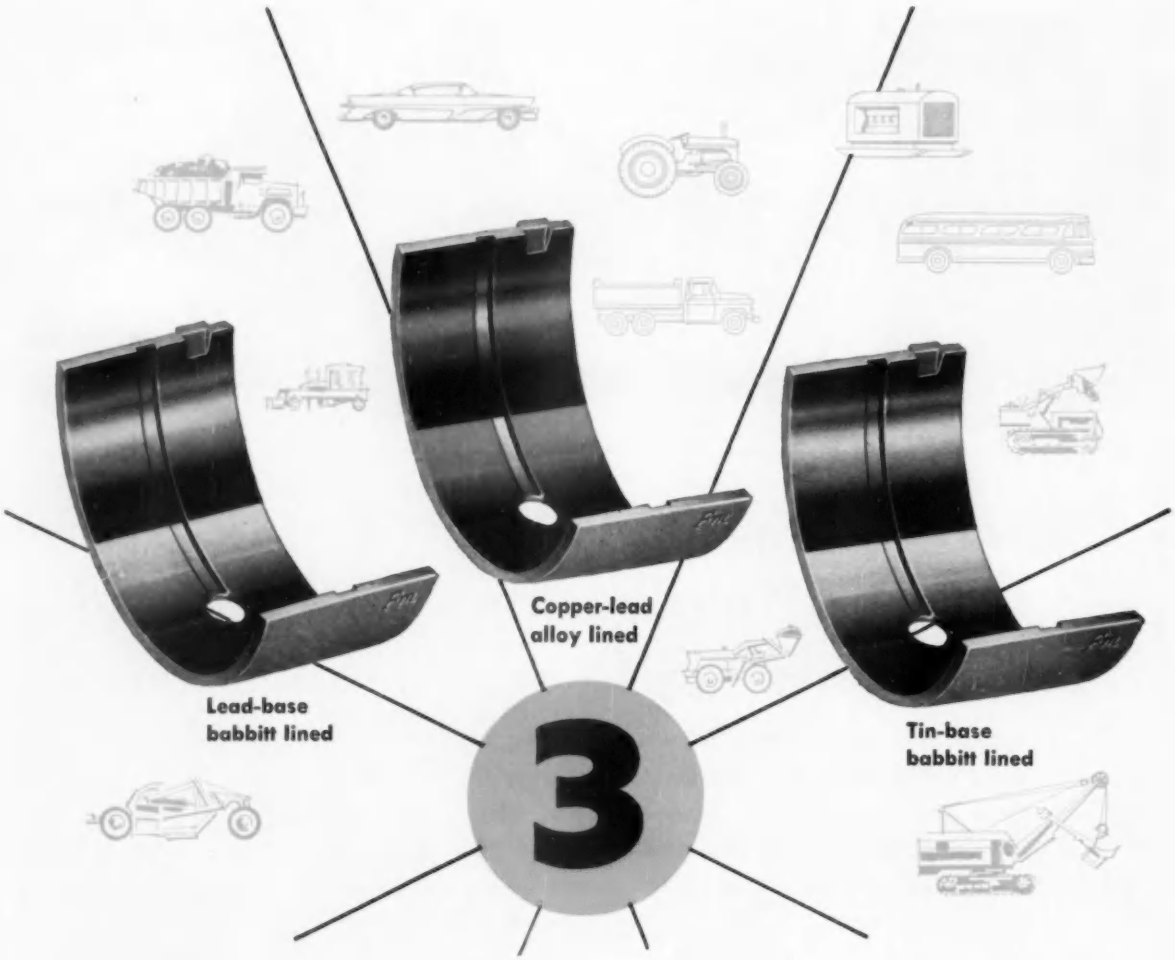

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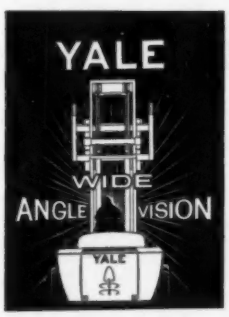

Only new Yale 15,000-20,000 lb. capacity Gas Trucks offer you "Wide-Angle Vision"—Yale's exclusive feature that gives the driver 300% more visibility for greater safety. Design advances such as nesting of upright channels; wide spacing of lifting channels and hoisting cylinders; high, center location of driver's seat assure not just unobstructed center visibility but also a greater arc of vision. New Yale Gas Trucks also feature a low center of gravity, a broader lifting base, wide channel-roller spacing and large high-flotation tires for maximum stability even under capacity-load conditions. Lifting speed of 60 feet per minute, fast controlled lowering, travel speed up to 20 MPH assure fast cycle operations.

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• I-beam side members in frame for extra strength • Channels mounted on ball-bearing rollers to reduce friction and wear • Ball-mounted, self-aligning hoisting cylinders • Your choice of Fluid Coupling or standard transmission.

To meet the need of expanding industries for better materials handling methods and equipment, look to Yale for advances in research, engineering, manufacturing, sales and service—as YALE BUILDS FOR THE NEW ERA

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INDUSTRIAL LIFT TRUCKS AND HOISTS

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In Canada: write The Yale & Towne Manufacturing Co., St. Catharines, Ontario, Canada

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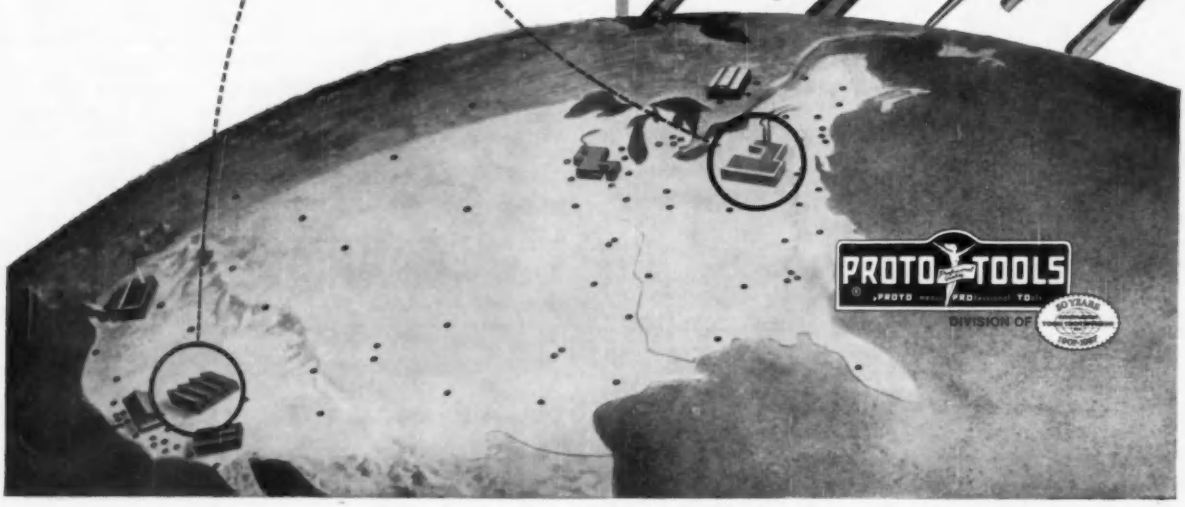
Founded in 1907, PROTO is today the World's largest producer of high-quality hand service tools. Leadership is attributable mainly to the *professional* quality of PROTO tools—resulting from intensive research, field-tested designs, special alloy steels, and superior manufacturing.

PROTO means PROfessional TOols!



It pays to equip your trucks with the Air Brakes America's Leading Fleet Operators prefer—

BENDIX-WESTINGHOUSE

"DURING OUR 88 YEARS IN BUSINESS

We've bought 350 trucks—and when it comes to Air Brakes, we prefer BENDIX-WESTINGHOUSE!"

MR. OLIVER G. WETTERAU, *Vice-President*
Wetterau Grocer Company, Inc.

From general headquarters in St. Louis, Missouri, Mr. Wetterau helps direct the activities of a vast wholesale grocery firm serving I. G. A. stores in central and eastern Missouri. Last year the company's fleet of 200 vehicles rolled up a total of 2,000,000 miles while delivering over $50,000,000 worth of dry groceries, meats, produce and frozen foods. "In distributing foods in this volume," says Mr. Wetterau, "low cost and close timing in every phase of operation are of paramount importance. Our Bendix-Westinghouse Air Brake equipment measures up in every detail." Wetterau Grocer Company operates three distributing centers and employs 425 people.

"In our 23 years of business

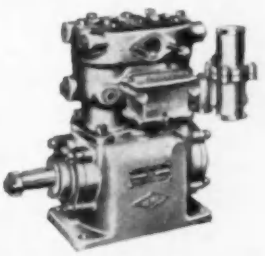
We've bought 1,150 trucks—and when it comes to Air Brakes, we prefer BENDIX-WESTINGHOUSE!"

MR. ARNOLD CASSENS, Secretary and Operations Manager, Cassens Transport Company

From general headquarters in Edwardsville, Illinois, Mr. Cassens helps direct the activities of a firm serving points in the Midwest and the West Coast. In 1955 Cassens Transport rigs rolled up a total of over 8,000,000 miles while hauling automobiles from Detroit, Michigan, to Illinois, Missouri, Kentucky, Iowa, California, Washington and Oregon. The company employs over 200 people and maintains terminals in Michigan, Indiana and Illinois.

It is a rarity, indeed, when a product in any field demonstrates customer preference so strong that it continually *outsells all other competition combined* year after year. Yet, for the past twenty-seven years, this has been the remarkable accomplishment of Bendix-Westinghouse Air Brakes in the truck and bus fields! In fact, recognition of the greater safety, economy and dependability of Bendix-Westinghouse Air Brakes by truck buyers has resulted in their factory installation on more and more truck models of all sizes.

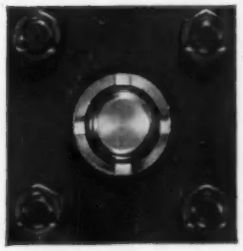
Chances are good that your trucks, too, offer the many advantages of these powerful brakes. If not, we suggest you take advantage of the proven preference and superiority of Bendix-Westinghouse Air Brakes by offering them as factory-installed equipment. It's one sure and easy way to add more sales-appeal to your vehicles!



Over 2,000,000 compressors produced over a twenty-seven-year span stand behind the TU-FLO 400. Many advanced features guarantee performance no other compressor can equal.

Bendix-Westinghouse BENDIX-WESTINGHOUSE AIR BRAKES® **AIR BRAKES**

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY • General offices and factory—Elyria, Ohio. • Branches—Berkeley, Calif., and Oklahoma City, Okla.



Here are the world's finest power cylinders

...competitively priced!

This ad is written for the man who has thought all cylinders are "pretty much alike." That just isn't so, and your Hannifin man would like an opportunity to show you why...

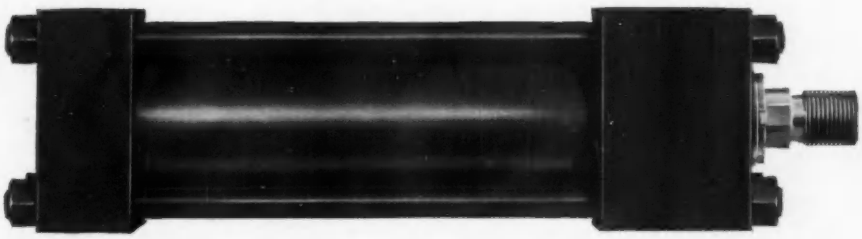
He'll show you design features that other cylinders simply do not have... extra quality workmanship at critical points that pays off in longer life ...accessibility that simplifies their infrequent maintenance. And when he talks price and delivery, you will find these better features cost you no more, can often be delivered sooner.

We think you'll agree that it pays to standardize on Hannifin cylinders.

AIR AND HYDRAULIC

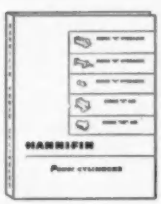
HANNIFIN

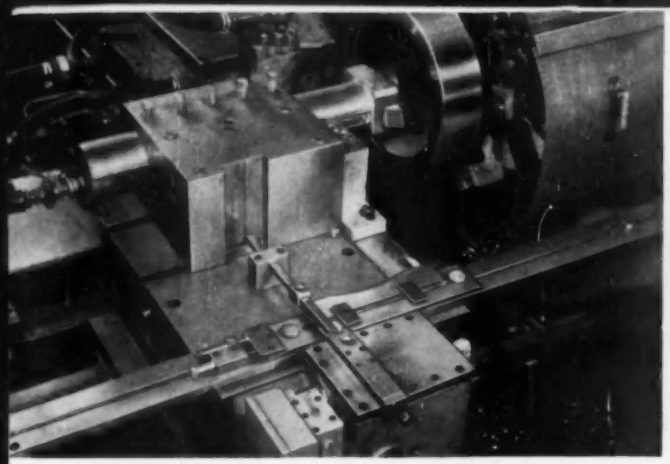
POWER CYLINDERS



COMPLETE CYLINDER FILE

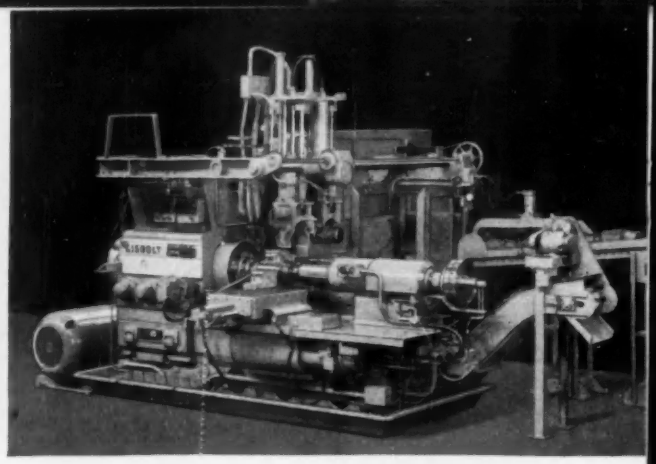
Write for your copy of this new Hannifin Cylinder File . . . complete, easy-to-use, easy-to-order-from information on five lines of Hannifin Cylinders. Write Hannifin Corporation, 543 S. Wolf Road, Des Plaines, Ill.





NO. 24—WITH CHUCK

Ninety pounds of tough bearing steel are removed in two 8-minute operations on this job. One No. 24 handles six types and 24 different sizes of inner and outer bearing races with ease and efficiency. A JETracer on the rear independent slide simplifies spherical, straight and taper boring operations—also improves accuracy and finish and lowers unit costs.



NO. 24—ON TAILSTOCK-SUPPORTED EXPANDING ARBOR

Automatic loading and unloading are part of the machining cycle on this setup. Utilizing overhead clamps and a traversing carriage arrangement, the No. 24 makes fast work of these tough steel tool joint forgings. The operator has separate push-button control over all machine and handling functions for faster, easier setups and change-overs.

YOU CAN REDUCE COSTS ON

NEW GISHOLT MASTERLINE NO. 24

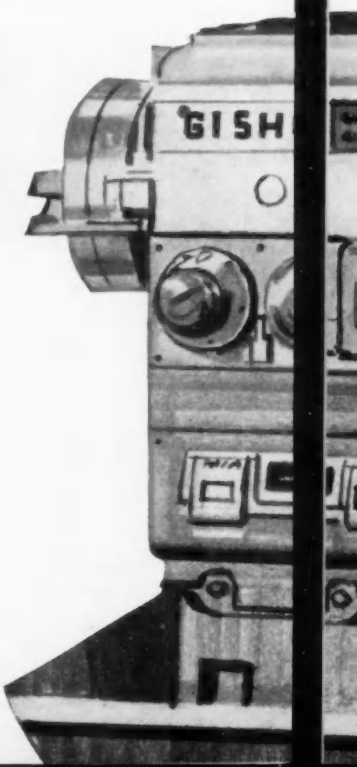
WHETHER YOUR LARGE PART PRODUCTION INVOLVES long, steady runs or small repeat lots, you'll find definite ways to cut costs with this new Gisholt MASTERLINE No. 24 Automatic Production Lathe.

And you can realize these savings whether your work has to be held on an arbor, in a chuck or special fixture, or between-centers with work driver and tailstock—for the big No. 24 will handle parts all four ways.

Cost cutting with this extra powerful (up to 125 h.p.) single-spindle automatic is inherent within its standard automatic cycle. Hydraulic control of all carriage and auxiliary slide movements—plus automatic stopping and starting of the spindle—lets one operator handle two or more of these machines, or perform other jobs during machining time.

Still more savings are realized through faster, easier setup and shorter change-over periods. During setup, all hydraulic actuated movements may be manually controlled. Spindle speeds, feeds and stops are easily changed. This means you can produce a variety of large parts—or handle small repeats—without excessive down time between sizes or jobs.

Whatever type of large part you are producing now—or planning for the future—your Gisholt Representative can show you how and where the No. 24 will produce it for less cost. Call him today—or write Gisholt for complete information.



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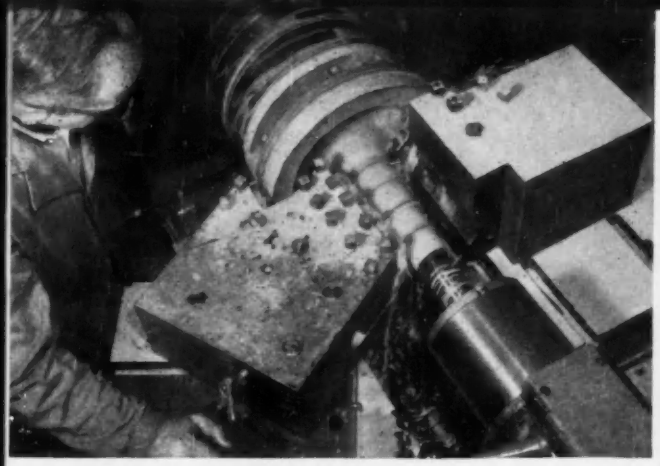
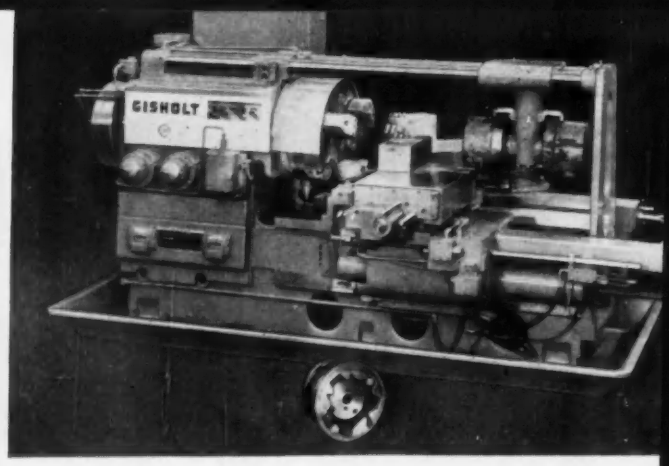


NO. 24—WITH CHUCK AND TAILSTOCK SUPPORT

With this setup, husky airplane drive gear and propeller shafts are completed in two fast operations on two No. 24's. One man handles both machines. The first operation is shown. Five diameters are machined plus turning, facing and chamfering. The second operation, on the other end, is similar. Floor-to-floor time: 12 min. per operation with 75 lb. of metal removed.



NO. 24—WITH CHUCK AND LOADING ARBOR

Here, standard tooling plus a unique, indexing-loading arbor arrangement on the No. 24 has cut costs and reduced effort in the machining of heavy cast iron diesel cylinder heads. Floor-to-floor time is only 1.2 minutes. More time is spent making chips because most of the loading-unloading operation is performed while the tools are working on the next part.

LARGE PART PRODUCTION WITH THE

AUTOMATIC PRODUCTION LATHE

a

A **POWER OPERATED BARREL TYPE SLIDE ADJUSTMENT** facilitates and speeds die-setting. Push button operated, it's not only fast and smooth but permits micro-positioning within a thousandth of an inch.

B **HYDRAULIC INCLINING DEVICE** operates smoothly. The press can be inclined or brought upright in approximately 2 minutes. Operating lever and push buttons conveniently located on left panel leg.

C **BRAIN CENTER OF THE AUTOMATION SYSTEM,** the Rotary Limit Switch can be adjusted precisely while the press is in motion for synchronizing automation devices with press cycle.

D **LOW INERTIA, ELECTRO-PNEUMATIC FRICTION CLUTCH** operates directly on the crankshaft. Most of its weight continues to rotate with the main gear. Only the crankshaft and driving plate are started and stopped at each cycle. Heat and wear are reduced to an absolute minimum. Torque capacity may be changed by adjusting air pressure.

truly revolutionary line of OBI's

automated to hit new production highs

Never before has there been an OBI like this. In feature after feature, you'll see pulse-quickening newness that will inject speed and rhythm into your production. Outfitted with today's most advanced controls and devices, this all-new Niagara Series EA offers you automation at its very best.

Boasting a revolutionary front-to-back crankshaft design, it's streamlined in an ultra-modern, functionally sound, eye-pleasing way. In fact, it's the only totally-enclosed OBI ever made. There are no exposed, overhanging gears, flywheel or other mechanisms. With the entire driving assembly fully enclosed within the limits of the compact frame, this trim-line performer actually takes up less floor space than any press in its range and category. It's only natural that such a triumphant line of OBI's as this should parade from Niagara . . . for Niagara has been leading the way, *all of the way,* in building all types of OBI's — single crank and double crank, standard and fully automatic. Hailed as "the latest and greatest of them all," the Series EA is built in 4 sizes, with shaft diameters from 4½ to 7½ inches and capacities from 75 to 200 tons.

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E **AIR CONTROL PANEL AND HYDRAULIC INCLINING SYSTEM** are neatly housed within the left leg. Air line filter, pressure regulator, gages, blow-off valves and lubricators, as well as the hydraulic pump for the inclining system, are all concealed behind a dust-tight door.

F **AUTOMATIC CIRCULATING OIL SYSTEM** (left panel leg) sends metered flow of clean, filtered oil to all bearings and gears in the crown, air counterbalance and slide gibs. Correct operating oil pressure is maintained or the press stops automatically.

G **CONTROLLED AIR SUPPLY AND PNEUMATIC TIMING RELAYS** (left panel leg): Air line receptacles, synchronized with press cycle, are provided for die doper, die kicker and die lifter . . . with auxiliary receptacles for die maintenance tools. Adjustable timing relays control interval of automation functions initiated by rotary limit switch.

H **OPERATOR'S PANEL** (right panel leg) features deluxe operating controls conveniently arranged for fingertip direction of every press motion. Chained to safety block, safety plug de-energizes entire press control when pulled from its receptacle.

I **COMBINATION MOTOR AND PRESS CONTROL PANEL** fully enclosed within the right leg behind a flush-mounted, dust-and-oil-tight door, houses: disconnect switches, circuit protection, transformers, fuses for main motor and auxiliary power supply; control relays; starters for main motor, lubrication and hydraulic pumps.

PNEUMATIC CUSHION is automatically lubricated by self-contained pumping system; internally guided and rigidly supported by press frame.

NIAGARA

front-to-back crankshaft AUTOMATED INCLINABLES

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for those little parts that play such a big part...

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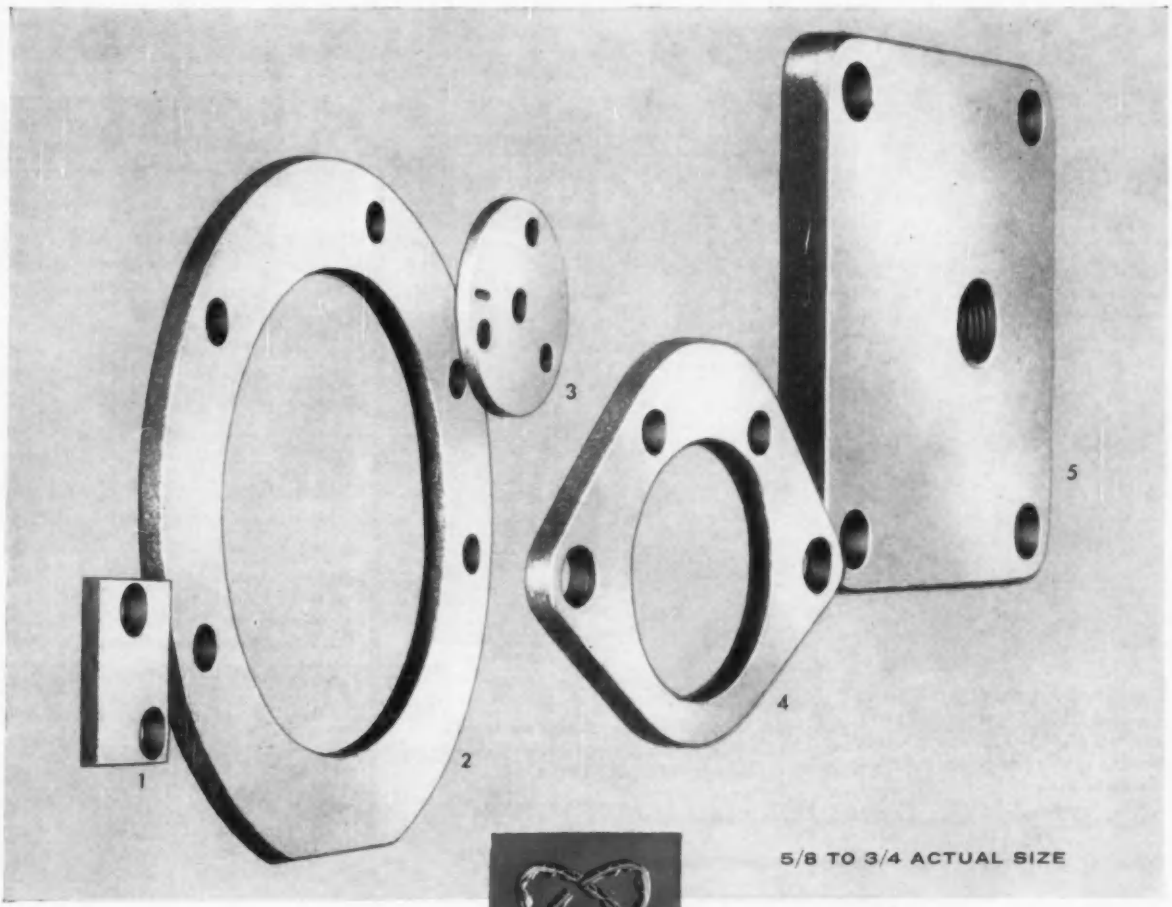
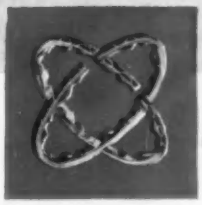
IN DETROIT—SAM T. KELLER, 1212 FISHER BUILDING



From the producer of piston rings  used in 1 out of every 3 new cars . . .

"Captive Cost" castings-precision finished and machined

Muskegon's Sparta Foundry now offers these important advantages in the production of your small precision castings.

1) Parts at surprisingly low cost.
2) Complete service from design conception to finished product.
3) Precision cast parts in rough form, partly finished or shipped ready-to-install—completely deburred, drilled, reamed or tapped . . . with surface finishes and flatness to your specifications.
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(1) Automatic transmission governor cover plate.
(2) Countershaft retaining ring.
(3) Compressor thrust plate.
(4) Camshaft attaching plate.
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MUSKEGON Piston Ring Co.

PLANTS AT MUSKEGON, MICHIGAN SPARTA, MICHIGAN
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Since 1921... The engine builders' source!

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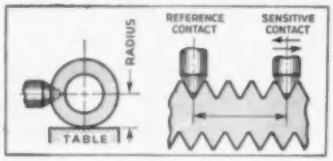
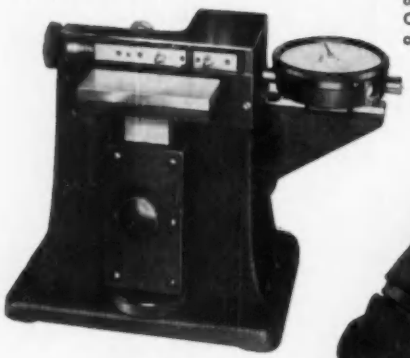
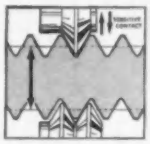


Lead accuracy is precisely determined at a glance. Error is not averaged as with multiple contact anvils.



Thread Lead Gage Model 1141
Compares lead of screw threads —also spacing of holes, notches, grooves, etc.



Lead errors do not affect readings. Contacts engage one thread only.

THREAD GAGES

Pitch Diameter Gage Series 45
For fast inspection of pitch diameter of threads by roller contacts.

DEPTH GAGES

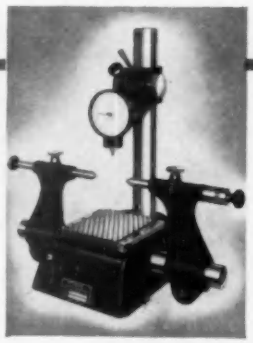
Modifications of stock model depth gages facilitate production line inspection.

Bench Type Indicating Depth Gage
Model 75B-1 Long, 2" range.

COMPARATORS

OVER TEN TYPES
Universal Dial Comparator
Model 100B-20

Highly accurate instrument. Attachments shown greatly extend gage's versatility.



Center Attachment
Model A-100B-20-3

Roller V Block Attachment
Model A-100B-20-4

The "Super Benchmaster" Model 110B-3
Accurate to 50 millionths. Capacity 0"—3.750". The ultimate in mechanical gage precision.

Little to SEE How You're Doing

You really know quickly and definitely how closely you are working to the required dimensional specifications when you use these and any of the many other Federal Dial Indicating Gages.

You see ahead of time whether you are taking off too much metal before you produce any scrap. You can see on the Dial Indicator just when you have obtained the correct dimension.

And you'll find these low cost gages will take care of the greater number of your requirements. There's no need of spending more money for more elaborate, higher priced gages except where their use is really necessary. Federal offers a big selection of gages from which you can select the best for your purpose. Do you have our catalog? If not, write.

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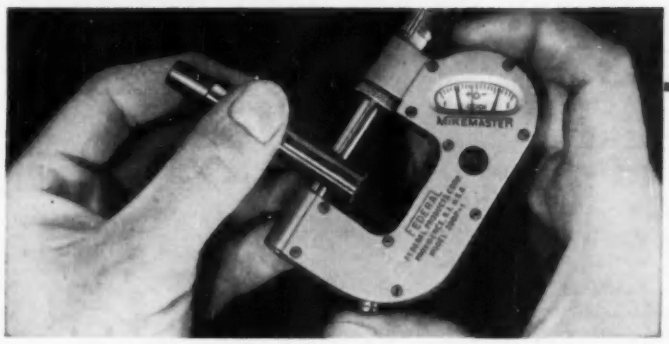
Indicating Crankshaft Gage Model 1340P-40

Extremely thin, measures diameter of crankshafts where projections are large and/or closely spaced.

INDICATING MICROMETER



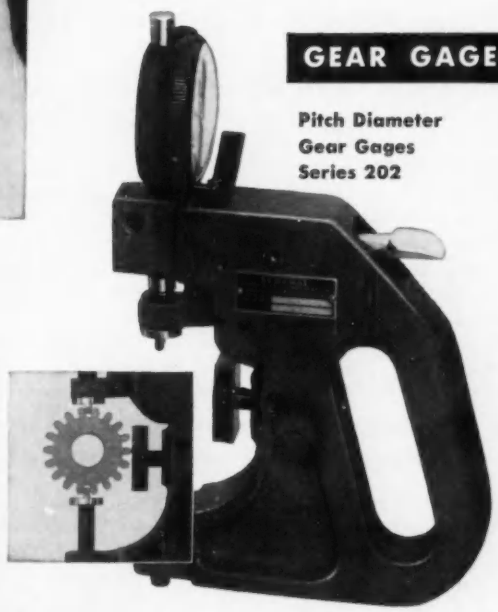
Federal Mikemaster Model 200P-1

You read it more accurately. Always measures with same gaging pressure—provides uniform, accurate dial readings. Can be used as a micrometer, or an indicating snap gage.

SNAP GAGES

GEAR GAGES

Pitch Diameter Gear Gages Series 202



Measure pitch diameter of spur gears, helical gears, splines, and chain sprockets — with either even or odd numbered teeth. Easy to use and reliably accurate.

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Shows most complete line of dial indicator gages. Send for your copy.

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OF COMING SHOWS AND MEETINGS

National Tool & Die Mfgrs. Association, summer meeting, Grove Park Inn, Asheville, N. C...July 24-27

National Machine Tool Builders' Association and American Tool Distributors' Association, annual sales conference, Cornell Univ., Ithaca, N. Y. ..July 20-Aug. 2

Eleventh Annual National Convention, Air Force Association and Airpower Panorama, Sheraton-Park and Shoreham Hotels, Washington, D. C. ...July 31-Aug. 4

National Aviation Meeting, San Diego, Calif. .....Aug. 5-10

ASME Heat Transfer Conference, Penn State, University Park, Pa. .....Aug. 11-15

Bendix-Scintilla International Ignition Conference, annual meeting, Sidney, N. Y. .....Aug. 20-22

Western Electronic Show and Convention, Cow Palace, San Francisco, Calif. .....Aug. 20-23

Leipzig Fair, Germany .....Sept. 1-8

Farnborough Air Show, England.Sept. 2-8

Canadian International Air Show, Toronto, Ont., Canada .....Sept. 6-7

American Institute of Electrical Engineers, Petroleum Industry Conference, Sheraton Hotel, Philadelphia, Pa. .....Sept. 9-11

SAE Tractor and Production Forum, Hotel Schroeder, Milwaukee, Wis. .....Sept. 9-12

Instrument Automation Conference and Exhibit, Auditorium, Cleveland, O. .....Sept. 9-13

National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J. .....Sept. 11-13

ASME Petroleum Mechanical Engineering Conference, Mayo, Tulsa, Okla. .....Sept. 22-25

Standard Engineering Society, annual meeting, Hotel Commodore, New York, N. Y. ...Sept. 23-25

ASME Fall Meeting, Statler Hotel, Hartford, Conn. .....Sept. 23-25

Material Handling Institute, Joint-Industry fall meetings, Greenbrier Hotel, White Sulphur Springs, W. Va. .....Sept. 30-Oct. 1

National Electronics Conference, Hotel Sherman, Chicago, Ill..Oct. 7-9

ASLE-ASME Lubrication Conference, Royal York Hotel, Toronto, Ont., Canada .....Oct. 7-9

American Institute of Electrical Engineers, fall general meeting, Morrison Hotel, Chicago, Ill. Oct. 7-11

ASME - AIME Fuels Conference, Chateau Frontenac, Quebec, Canada .....Oct. 10-12

Pressed Metal Institute, annual meeting, Castle Harbor, Bermuda .....Oct. 13-17

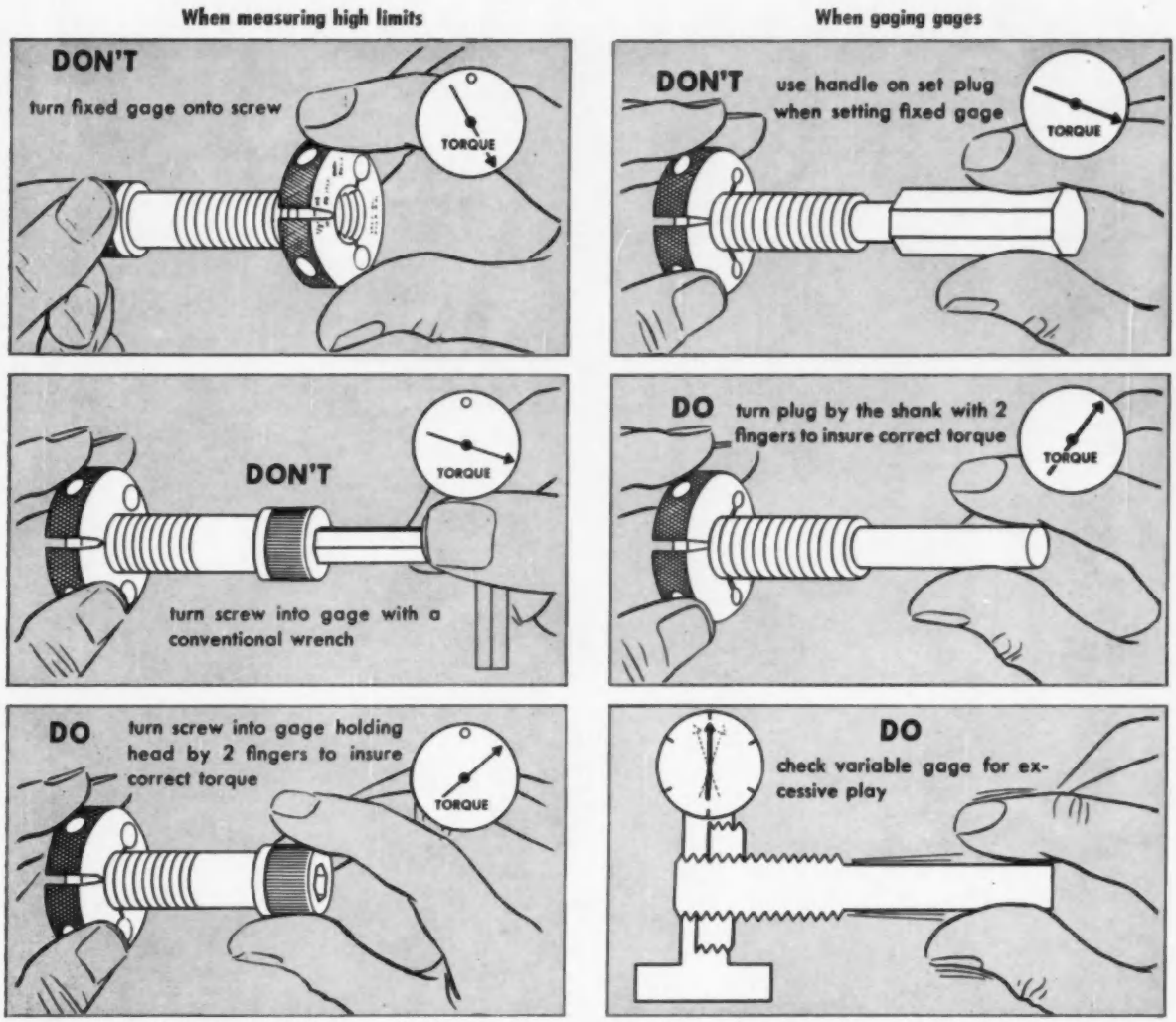
American Society of Civil Engineers, annual meeting and show, Hotel Statler, New York, N. Y. .....Oct. 14-18

International Motor Show, Earls Court, London, England ...Oct. 16-26

National Conference on Industrial Hydraulics, Hotel Sherman, Chicago, Ill. .....Oct. 17-18

ASME Power Conference, Americus Hotel, Allentown, Pa...Oct. 21-23

Computer Applications Symposium, Hotel Sherman, Chicago, Ill. Oct. 23-24



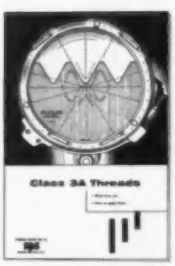
These illustrations from new SPS booklet show some of the do's and don'ts of gaging precision threads.

3A threads: what they are; how to gage them — new SPS booklet tells all

Threads made to Class 3A fit are the most precise in general use in industry. But you do not always get the 3A precision you specify. Because of many different gaging techniques that yield varying results, screws with threads well outside the Class 3A tolerance limits often pass inspection.

SPS has prepared a new booklet on this subject. It explains clearly what Class 3A threads are and the pros and cons involved in the widely varying gaging techniques in use today. It reviews the gaging of high and low limits of 3A threads, sampling techniques, and even the methods of gaging gages.

All standard UNBRAKO socket screw products fall within specified tolerance limits *no matter what method is used to gage them.* Leading industrial distributors carry complete stocks. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 53, Pa.



Form 2239, "Class 3A Threads: what they are; how to gage them." 16 pages, with many illustrations. Write for free copy today.

STANDARD PRESSED STEEL CO.

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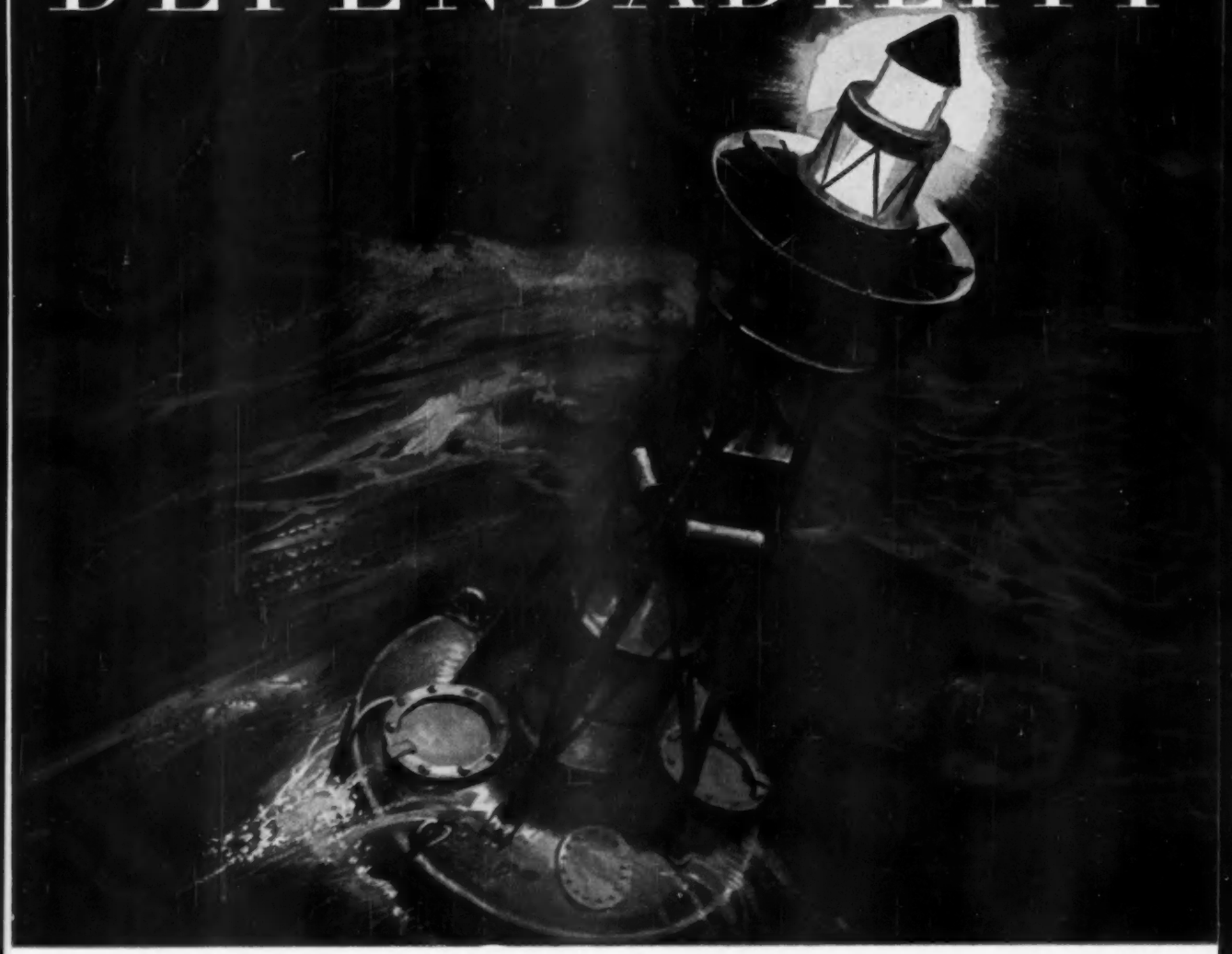

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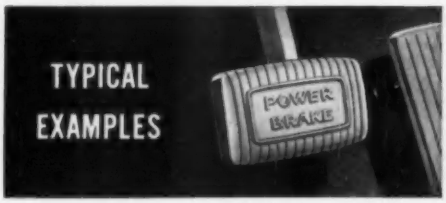

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High Spots of This Issue

▼ Shell Molded Crankshafts for Outboard Motors

A highly automatic production setup has been installed at the Milwaukee foundry of the Evinrude Motors Div. of Outboard Marine Corp. This article shows, step by step, how a close-tolerance, shell-molded crankshaft is turned out. Page 52.

▼ Modern Assembly Methods at Volkswagen Plant

The one million sq ft body and assembly plant described here is one of the most modern and best-planned factories in Europe. Employing some 5600 people in two shifts, the plant has reached a planned capacity of 400 units a day. Page 58.

▼ Nickel Sulfamate Bath for Stress-Free Plating

A nickel sulfamate bath used extensively in nickel plating operations at Ryan Aeronautical Co. has resulted in the salvaging of valuable components for jet airplanes. The entire process and its advantages are described here. Page 65.

▼ Jet Engine Weight Control

The authors discuss the progress being made today in reducing jet engine weight and the necessity for planned weight control programs if such progress is to continue. The contributions of each member of the development team are analyzed. Page 66.

▼ Motocylinders—A New Tool for Machine Designers

Motocylinders, sometimes known as autocylinders, can be used in the automotive industries to do the work now being done by pneumatic and hydraulic cylinders. How these devices are used to impart reciprocating motion to machine members is told here. Page 68.

▼ 32 New Product Items And Other High Spots, Such As:

Canada's expanding aircraft exports; protection against carbon monoxide; a booster for hot water car heaters; combination sparkplug and pressure pickup; farm equipment trend; Pyroceram; French car designs; and industry statistics.

Bendix Power Brakes®

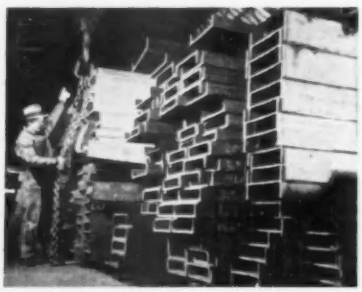
Bendix Power Steering®

BRAKES • POWER STEERING • POWER BRAKING • CONSTANT VELOCITY UNIVERSAL JOINTS • HYDRAULIC REMOTE CONTROLS

REPORT FROM RYERSON on Services and Products in Stock

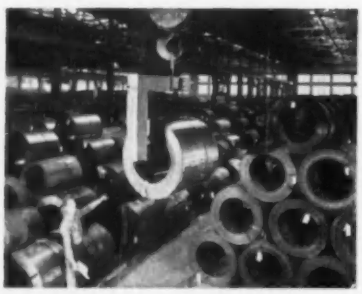
In addition to the products shown below, you can call on Ryerson for flame-cut steel shapes, fabricated steel for reinforced concrete or steel frame construction—many other products and services. And equally important are the specialists who carry out the Ryerson quality control program —see that customers specifications are *exactly* met, that every order is correctly filled and promptly delivered. As a result you get unequalled service and certified quality when your company calls Ryerson for steel, aluminum, industrial plastics and machinery.

CARBON STEEL & ALLOY BARS Most complete range of types, shapes and sizes as well as largest tonnage.

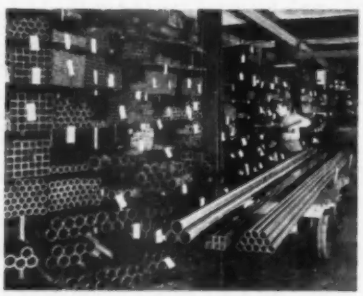


STRUCTURALS—I-beams, H-beams, channels, angles, tees and zees—all high quality steel to ASTM spec. A-7.

PLATES—14 types including special low carbon steel plates for forming and welding, leaded New E-Z-Cut, etc.

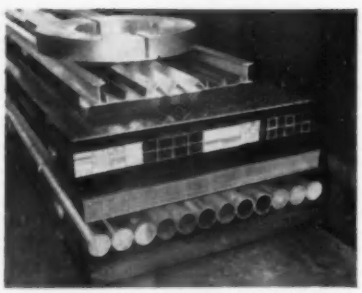


SHEET STEEL & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



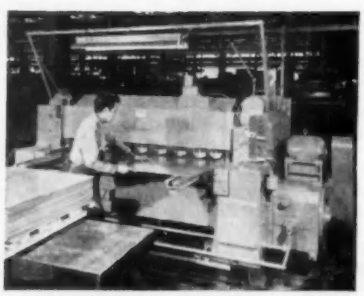
TUBING—Seamless and welded steel tubing—mechanical tubing, fluid line, pump cylinder and structural tubing.

STAINLESS STEEL—Allegheny stainless in over 2,221 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



ALUMINUM—At many Ryerson plants —sheets, coils, plates, bars, tubing, architectural and structural shapes, etc.

INDUSTRIAL PLASTICS—PVC pipe, fittings, sheets and rods, rigid Kralastic and flexible polyethylene pipe.



MACHINERY & TOOLS—The broadest line of metal-working equipment available from a single source.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 117, No. 2 **July 15, 1957**

Two Convertibles, Five Wagons To Be Offered In Edsel Series

Edsel's 18-model lineup of cars scheduled for introduction this fall will include two convertibles and five station wagons. One convertible will be offered in the Pacer series, which will be one step above the lowest priced of the four-passenger car series, while the other will be available in the top-priced Citation series.

The station wagons will be offered as a separate fifth series. They will include models ranging from a two-door, six-passenger model to a four-door, nine-passenger wagon. Only one two-door sedan will be offered in the entire passenger car series, which points up the trend away from that body style. It will be in the lowest-priced Ranger series.

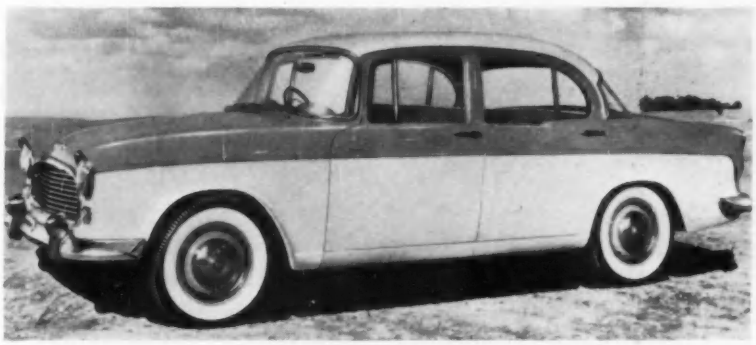
Sales Gap Between Plymouth And Buick Continues To Widen

Plymouth now has a pretty firm hold on third place in sales. Registration figures for the first six months of the model year show Plymouth ahead of Buick by 64,406 units. The margin between the two has been widening steadily since February, with Plymouth's edge rising from 30 per cent that month to more than 45 per cent in April.

Bohn and White Sell Diamond T Interests

Diamond T Motor Car Co. will remain intact, according to Mailman Bros. and Associates, a group of New York and Florida businessmen who bought a 32 per cent interest in Diamond T from Bohn Aluminum and Brass Corp. Although the Mailman block gives the group a big voice in the operations of the Chicago truck company, it said it has no plans to merge the company or resell the stock.

Meanwhile, White Motor Co. sold its holdings in Diamond T—about 13,000 shares of common stock. Bohn sold Mailman Associates 137,480 Diamond T shares at an average of $25 a share, about $3 a share more than it paid in 1954-55.



FULL-SIZED HUMBER HAWK IS ROOMY THROUGHOUT

The British Rootes Group's latest bid for the big-car market is the new Humber Hawk with integral body-chassis construction to keep dry weight down to 2975 lb. The six-seater is powered by a four-cylinder engine of 138.2 cu in. displacement that develops 78 bhp at 4400 rpm. Rubber mounting blocks minimize vibration and road noise.

British Car Sales Increase in U.S.

British car sales in the U. S. for the first four months of the year total 17,500 units, up 154 per cent from the corresponding period for 1956.

This gain has brought the British share of all foreign car sales in the U. S. to 34.6 per cent, as compared with a percentage of 26.5 for the same period last year.

A breakdown of these figures shows that small economy cars are ahead with a 174 per cent increase, and that sports cars led mainly by Austin-Healey, Jaguar, M.G., and Triumph are 105 per cent higher.

Buick Installation Reclaims Diamond Dust From Grinding

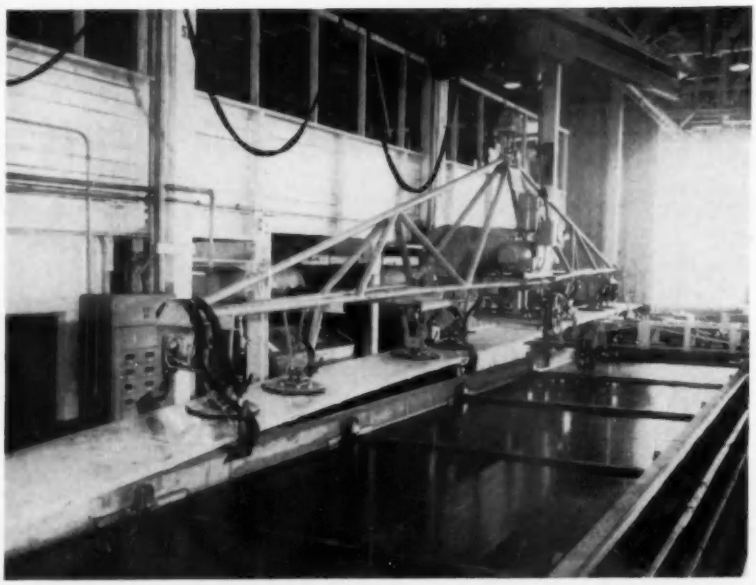
A dust collector that reclaims diamond dust from grinding wheels has been installed at Buick.

Developed by a supplier at the suggestion of Buick, the unit is the first practical application of a machine of this type in industry, according to Jesse L. Powers, general manufacturing manager. It will enable industries to stockpile their own diamond dust for emergencies, he says.

Because the United States must depend on foreign countries for its entire supply of industrial diamonds, diamond dust is of strategic importance in wartime, Powers notes. During the Korean war, Buick had to wait 14 months for a particular type of diamond grinding wheel because diamonds became so scarce.

The collector will catch as much as 25 per cent of the dust from a diamond wheel, permitting the saving of about 300 carats in a 1200-carat wheel.

NEWS AUTOMOTIVE AND AVIATION



HIGH-FIDELITY SOUND PICKS OUT FLAWS IN METAL

A 50-ft-long extrusion for the wing of Lockheed's Electra transport is about to be immersed in a ultrasonic testing tank at the aircraft firm's Burbank, Calif., plant. Sound waves at a frequency of 2.25 to 25 million cycles per second survey the part, and relay a sound portrait to a viewing scope on the control console. Any internal flaw in the metal, affects the sound wave and shows up on the scope for detection.

Rambler Reversing Trend Toward 8-Cylinder Engines

American Motors is reversing the continual upward trend in sales of V-8 engines. While V-8s now account for a greater percentage of sales by most car makers, AMC currently is installing 6-cylinder units on approximately 80 per cent of Rambler production, indicative of a definite trend toward economy among Rambler buyers. AMC of course has been promoting economy for some time, is pushing it in ads now more than ever before.

Huge Safety Demonstration Planned By Ford This Fall

Now that the automobile industry has agreed to de-emphasize horsepower and speed in advertising, car company ad departments are busy sarching for new ideas to pitch to the public. Ford once again is starting to talk safety, a subject which has cooled off somewhat during the past year.

Although the company has been very much safety-minded, its advertising has, during the past year or so, emphasized performance, durability and styling, since it felt these were more potent sales tools. Now the switch apparently is back to safety.

Sometime this fall, the company will stage a huge demonstration of safety features in automobiles, and is inviting governors of the 48 states to view the show. The demonstration, to be held in Dearb rn, will be a follow-up to the national traffic safety conference which Ford sponsored two years ago. Again, Ford will tell what is being done to make cars safer.

In another approach to safety, Ford Div. recently announced a program designed to help truck drivers upgrade their driving skills and habits. Some 140 safety directors of major trucking firms throughout the country will be invited to attend weekly safety courses during a six-month trial period. If it proves popular, it will be conducted on a continuing basis in various trucking centers around the country.

To be conducted for Ford by the Institute of Driver Behavior, experts will evaluate truck drivers on a 12-point rating system, and then outline five principles for new habit formation that will help avoid accidents.

The program already has been tested by one large cartage company, which reported excellent results. It helped its 350 drivers cut their accident insurance claim rate in half and reduce the firm's accident cost by $130,000 annually.

Higher Steel Costs, Wage Rates Will be Seen in 1958 Car Prices

Next year's automobiles will carry higher price tags than current models, reflecting increased steel prices and rising wage rates of automotive production workers. Steel prices, already up more than three per cent since 1957 models were introduced, may go up again before 1958 announcement time.

How great an increase this would mean in car prices is open for debate, since automobile prices do not follow steel price increases to the cent. Since the 1947-9 boost, the wholesale price of finished steel products has gone up 73.9 per cent, while automotive wholesale prices have increased only 34.6 per cent.

Automotive factory wages have gone up at least 15 cents an hour, or 6.3 per cent, since last September. Cost of living increases and a six cent annual improvement boost last month brought the total to about $2.49 an hour. Fringe benefits boost the total even higher; but the six cent improvement factor theoretically covers better productivity, and therefore would not show up in a price increase.

New Anti-Knock Compound Developed by Ethyl Corp.

Ethyl Corp. has reported that a new anti-knock compound for aviation gasoline developed in its laboratories has permitted power gains of up to 20 per cent in full-scale engine tests. The tests, conducted cooperatively with Curtiss-Wright Corp., were made in the latter's 18-cylinder Turbo Compound engine.

The compound, designated tentatively as AK-33X, was used in the tests to supplement the anti-knock action of tetraethyl lead. The tests were conducted at the engineering laboratories of the Wright Aeronautical Division of the Curtiss-Wright Corp. in Wood-Ridge, N. J.

Although AK-33X is in the research and development stage, Ethyl meanwhile is studying the broad applications of the discovery, including its potential use as a supplementary additive for motor fuels. AK-33X was described as being an organic compound of manganese.

Automotive Output Increased 4.1 Per Cent Over 1956 Half

Automotive production for the first half of 1957 totaled 3,951,149 vehicles, an increase of 4.1 per cent over last year and second only to record-breaking 1955. Included were 3,375,281 passenger cars, 573,606 trucks, and 2262 buses.

Significant in the production totals were substantial increases by Chrysler Corp. (52 per cent), and Ford Motor Co. (16 per cent), and a drop in General Motors output (11 per cent). While Chrysler Corp. expects only brief production interruptions for 1958 changeover, GM anticipates longer shutdowns due to more extensive model changes.

X-14 VTOL Plane Could Signal Bell's Return to Production

Bell Aircraft Corp.'s newest jet-powered vertical-rising airplane, some details of which have just been revealed by the Air Force, may be Bell's candidate to get the company back into the airplane business.

The Air Force said Bell's new X-14 has completed initial flight testing successfully. This airplane is powered by two jet engines and is designed to take off and land vertically in a conventional horizontal position, shift to forward flight and land vertically.

The craft differs from the so-called "tail sitter" vertical take-off or landing airplane—developed by other companies—in that the Bell X-14 can operate without the help of ground-handling equipment to position it for take off.

Bell's last production airplane, other than helicopters of which it is a major producer, was the World War II P-59 Airacomet. It was discontinued after WW II.

Car Makers Scan Small Car Market

General Motors' decision to move into the small-car field with its 98-inch wheelbase European-built Vauxhall Victor and Opel Rekord was not unexpected. GM, as well as all other U. S. makers, has been watching the small-car trend for some time; GM decided now was the ripest time to test the growing market.

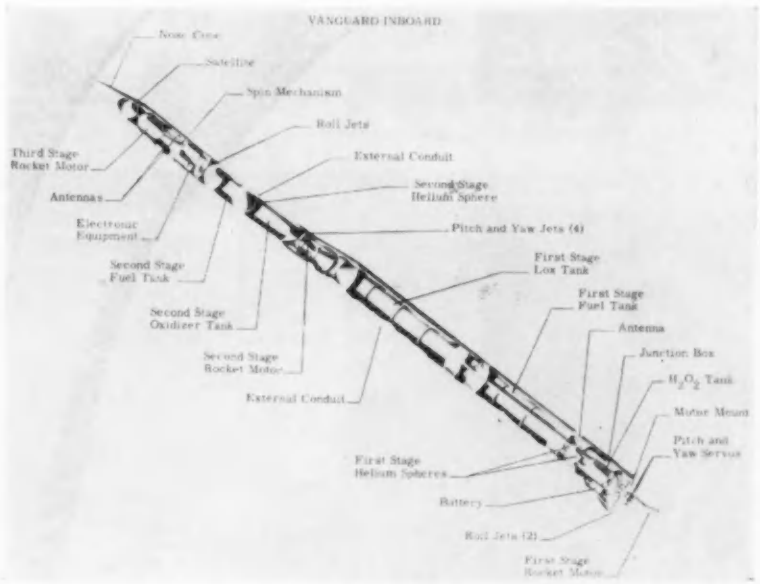
GM plans initially to import only a limited number of the cars—some 24,000 units—the first year into key areas. Sales of the cars certainly will dictate decisions as to whether domestic development and manufacturing of a small car is feasible. GM's move obviously shelves such plans, at least for the foreseeable future.

A tip-off that GM was preparing to plunge into the market came when the corporation displayed the Victor Vauxhall in the General Motors Building in Detroit, first time a foreign-made car was exhibited in the GM showcase. Public response to the car reportedly was highly favorable, and it undoubtedly helped influence GM's move.

Chrysler Corp. remains the only U. S. maker without a foreign-made car to market. But the fact that Chrysler engineers have just returned from a "study trip" in Europe, where they scanned the small-car situation, lends impetus to talk that Chrysler seriously is considering a small car.

What effect GM's move will have on sales of other small, foreign-made cars and American Motors' Rambler remains a big question at the moment. Sales of the Rambler have been improving steadily and production of the small car now accounts for more than 90 per cent of AMC's total output. AMC is counting heavily on the car to bring the company into the black next year.

Prices of the Opel Rekord have not been announced yet, but it is expected to sell for about the same as the Victor Vauxhall, which carries a $1495 tag. The price does not include the present 10 per cent import tax, which is levied on the wholesale value of a car, and U. S. excise tax.



LAUNCH VEHICLE FOR VANGUARD SATELLITE DRAWN

The Navy and Martin Co. have announced the first officially released artist's rendering of the Vanguard satellite launch vehicle's configuration. The above vehicle is about 72 ft long, is 45 in. in diameter and weighs 22,000 lb. The first and second stages have gimbal-mounted engines which can be tilted to alter flight in any direction. This vehicle will propel the U. S. National Committee-IGY scientific satellite to an orbital velocity of 18,000 mph at an altitude of approximately 300 miles.

Fuel Injection Goals May Not Be Reached

Chevrolet so far has equipped about 2000 cars with fuel injection.

Production of the units has been reduced to a trickle recently, so it is highly doubtful that the original goal of 5000 installations will be reached this year. Pontiac expected to build about 1500 fuel injection cars this year, but has installed only a limited number of them for dealer testing purposes.

American Motors still hopes to equip a few Ramblers with its Bendix electronic unit, probably at the tail end of the 1957 model run. Problems encountered with the system's solenoid valves reportedly have been worked out.

TV Extravaganza To Kick Off GM's 50th Birthday Nov. 17

General Motors will kick off its 50th anniversary celebration with a two-hour musical extravaganza on the NBC television network Nov. 17. Starring the greatest array of musical talent ever assembled for a single TV performance, the live show, titled "General Motors Jubilee of American Music," will recall a half-century of the most popular American tunes, many of them sung and played by the stars who made them famous.

NEWS AUTOMOTIVE AND AVIATION

TRUCK BODY RAISES AND LOWERS TO TAKE ON CARGO

Railway Express is testing a new 16-ft, five-ton capacity truck with elevator-like body, called the Lo-Loader. Built by Thompson Trailer Corp., the body of the vehicle is actuated by hydraulic mechanisms. It raises for variable platform heights, as shown here level with loading dock, and lowers in 12 seconds to ground level for expedited sidewalk or street loading. Body raises to a maximum height of 54 in.

Rising Car Inventories Being Checked By Makers

Current high field stock of cars—estimated at between 775,000 and 790,000—should be pared substantially in the third quarter, now that car makers have adjusted production schedules to more closely parallel the lower rate of sales. The total in inventories is still a bit under the record 800,000 units at the same time last year.

Inventories could easily drop by at least 300,000 units in the coming weeks at the present rate of production, placing makers in a good position in final quarter of the year. Many makers pared production considerably last month. Suspension of operations for annual inventory by a few makers for various periods of time last month also should help trim stocks.

RUSSIAN TRUCK HAS LIGHTER FUEL REQUIREMENTS

Russia's newest truck from the Gorky Automobile Factory is the 2½-ton GAZ-52. The 202 cu in., four-cylinder engine drives through a four-speed synchromesh gearbox. This pre-production model is claimed to use 15 per cent less fuel than the GAZ-51.

Sealed Power Will Build New Distribution Center

Sealed Power Corp. plans to erect a new 70,000 sq ft distribution center in La Grange, Ind. The new facility will handle the distribution of all of the company's replacement products to its 22 regional distribution branches located in key locations throughout the U. S. The replacement warehousing operations currently located at the Muskegon plant will be transferred to the new location.

Rubber-Mineral Powder Rights Taken Over by Goodyear Tire

Patents and trade marks for a rubber-mineral powder, widely used for highway and industrial purposes and sold under the name "Rubarite", have been acquired by Goodyear Tire & Rubber Co. For production and merchandising purposes, Goodyear has established a Rubarite Manufacture and Sales Dept.

A new line of products will be offered for use as additives in improving the qualities of asphalt and tar for road building and miscellaneous industrial applications, such as roofing materials, pipe coatings, joint sealers, adhesives and other industrial products. The improved bitumen rubberizing materials contain 40 per cent by weight of unvulcanized synthetic rubber.

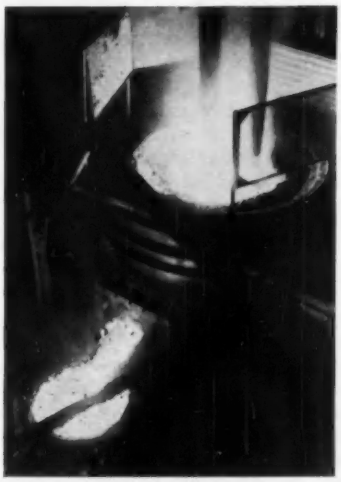
The new products will be manufactured under the administration of Goodyear's Research Div. Sales and technical service for industrial applications of Rubarite will be handled by the Goodyear Chemical Division's field sales organization. Laboratory work and field sales will be coordinated in Akron by Chemical Division's Rubber and Rubber Chemicals Dept.

Dayton Rubber Merges With Cadillac Plastic

Dayton Rubber Co. of Dayton, O., and Cadillac Plastic and Chemical Co., Detroit, have merged through an exchange of stock.

Under the agreement, Cadillac Plastic will retain its corporate name and will continue to operate under its present management and personnel as a wholly independent subsidiary of Dayton Rubber. Robert B. Jacob, president of Cadillac Plastic, and executive vice-president Richard J. Jacob, the founders, will continue in their present positions, as will managers of the seven Cadillac Plastic branches and all other officials of the company.

Sales of Cadillac Plastic and associated companies in fiscal 1957 are expected to exceed $8 million and net



VANADIUM PILOT PLANT

Smelting furnaces of new pilot plant opened by Vanadium Corp. of America at Cambridge, O., are used for experimentation and process and product development. Small furnaces accommodate research, while the larger can pilot new processes for immediate plant use.

earnings are estimated at between $350,000 and $400,000. Sales of Dayton Rubber Co. in the fiscal year ended Oct. 31, 1956, reached a record $75.81 million, with net income totalling $2.59 million.

Bell Acquires Site For Research Center

The Bell Aircraft Corp. has acquired 350 acres near Pembroke and the Ontario section of the Thruway as the site for its new Lawrence D. Bell Research Center.

President Leston Faneuf said the first unit to be built in the new research facility will be a $1-million wind tunnel "capable of handling the highest speed ranges." This will be followed by a laboratory for studying heat problems associated with supersonic aircraft and missiles.

Chrysler Press Plant Given High Safety Award by NSC

The National Safety Council's highest industrial safety award — the Award of Honor—has been presented to Chrysler Corp.'s Nine Mile Press plant in Warren Township near Detroit. To be eligible for the Award of Honor, plants in the stamping field must show consistent improvement in their safety record for three successive years. During 1956, the Chrysler plant logged more than 1.9 million man-hours without a disabling accident.

AI TABLOID

General Electric Co. has been awarded a $158 million contract by the Air Force for development work on the nose cones for its Atlas and Thor ballistic missiles.

* * *

Continental Car Combine of New York City has been appointed overseas distributor for England, France, West Germany, Spain, Switzerland, and Italy by American Motors Corp. for the Rambler and Metropolitan cars.

* * *

Republic Steel Corp. is planning a $14 million program to build two new batteries of coke ovens at its Cleveland steel plant.

* * *

Goodyear Tire & Rubber Co. recently tested on a coast-to-coast highway run truck tires made entirely of a new type of synthetic rubber called Natsyn.

* * *

Purolator Products, Inc., has acquired a 40,000 sq ft plant in Ringtown, Pa., as part of its expansion program. . . . Alloy Precision Castings Co. is enlarging its plant at Cleveland, O.

* * *

Johnson Bronze Co. plans to build a new $500,000 research laboratory, doubling its present research facilities. . . . Du Pont's Polychemicals Dept. will start construction soon on an expansion of its sales service laboratory at Chestnut Run, near Wilmington, Del.

* * *

Firestone Tire and Rubber Co. of Canada, Ltd., will add 25,000 sq ft of floor space to its branch facilities in Edmonton.

* * *

Pratt & Whitney Co. plans to establish branch sales offices in 9 more cities, making a total of 25 cities in the U. S. . . . Raybestos-Manhattan, Inc., has established a Pacific Coast Div. in Paramount, Calif., a suburb of Los Angeles.

* * *

Surface Combustion Corp. has set up a new Pelletizing Div. to market and engineer the process and equipment for complete pelletizing plants. . . . Ace Drill Bushing Co., Inc., has set up a new International Div.

Cities Service Co. recently dedicated its new multi-million-dollar research center at Cranbury, N. J. . . . Aerophysics Corp. has dedicated its new research and development center at Santa Barbara, Calif.

* * *

Superior Tube Co. is erecting a new office building and factory addition at its general offices and main plant near Philadelphia, Pa.

* * *

Consolidated Electrodynamics Corp. has changed the name of its Electronic Industries Div. to the Alectra Div.

* * *

Directors of Dow Chemical Co. and Dobeckmun Co. have approved a proposal for a merger of the two. Dobeckmun stockholders will vote on it Aug. 30.

* * *

De Havilland Aircraft Co. of England has announced the latest version of the Comet—the Mark IVE—which cruises at up to 545 mph at 23,000 ft.

* * *

Standard Pressed Steel Co. has acquired Columbia Steel Equipment Co., Inc., office furniture maker of Fort Washington, Pa.

* * *

General Electric Co. has launched a fusion research program at its Research Laboratory.

* * *

Rohr Aircraft Corp. has opened a new $500,000 assembly plant at Auburn, Wash.

* * *

SKF Industries, Inc. has acquired Tyson Bearing Corp.

* * *

American Brake Co. has moved its New York offices to 530 Fifth Ave., New York 36, N. Y. . . . Enjay Co. has moved its Western Div. headquarters in Chicago to Prudential Plaza, 130 E. Randolph Drive.

* * *

General Electric Co. has opened a second European office in Geneva, Switzerland to handle technical service of large and small commercial jet engines and aircraft accessories . . . Clearing Machine Corp. has set up a new office in the Fine Bldg., Toledo, O.

(*Turn to page* 183, *please*)

NEWS AUTOMOTIVE AND AVIATION

LIGHTWEIGHT BRITISH CAR HAS BODY OF PLASTIC

Coronet Cars, Ltd., has announced production of this three-wheel car with body made of polyester resin reinforced by glass fibers. It is mounted on an independent chassis of 14 gage steel. The Coronet is powered by a new Excelsior 20 cu in., air-cooled, Talisman two-cylinder engine which develops a total of 18 bhp at 5000 rpm.

Automobile Show is Unlikely To Come To Detroit Before '60

Reports that the next National Automobile Show may come to Detroit are unfounded. While such plans had been considered, unavailability of a suitable site for a show of such magnitude rules out the Motor City for at least two years.

Detroit's huge convention and exhibits building, only logical place to hold such a show, is still in the construction stage, and is not expected to be completed until Jan. 1, 1960. Although Detroit city officials are dickering with car companies to bring the show to their city, Detroit civic center officials say it is obviously out of the question now.

They hope, however, that the 400,000 sq ft exhibit building will be ready for showing of 1960 models. Although AMA is skipping the national show for 1958 models, it definitely wants to hold one in the fall of 1958 for 1959 models, and is exploring possibilities for a suitable date in New York's Coliseum.

3M REEFER

Refrigerated cargo unit for railroad use is made of Scotchply reinforced plastic developed by Minnesota Mining & Manufacturing Co. Built of "sandwich-type" panels, the box has joints bonded with an epoxy-base adhesive. It can be moved easily by a fork lift truck from railway flatcar to flatbed trailer and back again. Refrigeration is supplied by a thermostatically controlled dry ice circulating system.

Marbon Lowers Cycolac Prices

Marbon Chemical Div. of Borg-Warner Corp. this month announced lower prices on its Cycolac resin. Natural and standard priced color pellets will be sold at 58 cents a pound, a reduction of seven cents a pound. In powdered form the price will be 53 cents, a cut of five cents.

Chance Vought Developing Supersonic Navy Fighter

Chance Vought Aircraft is working on a new fighter that will carry the latest air-to-air missiles and will be able to intercept enemy bombers in all kinds of weather at more than twice the speed of sound, the Navy has revealed. Despite these high speeds, the new plane will be able to operate from land or a carrier deck.

The Chance Vought plane is powered by a J-75 afterburner-equipped Pratt & Whitney engine of 15,000-lb thrust. The swept wing is mounted high on the fuselage and well back of the cockpit section A sharp, pointed nose containing radar gear fairs smoothly into the cockpit area, and the airscoop is well forward under the nose.

Designed to be the Navy's first-line fighter, the plane incorporates some of the features of the company's supersonic F8U-1 Crusader, but is of completely re-engineered design.

Lighting Engineers Pierce Fog Barrier

Lighting engineers will be able to increase visibility in fog on the open highway by at least 100 per cent within the next year, says C. L. Crouch, technical director of the Illuminating Engineering Society.

Test conducted by two groups of scientists under the direction of the society's Research Institute showed that the fog barrier can be pierced satisfactorily by changing the mounting angles of fixed road lights for fog conditions; by equipping cars with low-mounted headlights, or with equally low-mounted polarized fog lights; or by a combination of the two.

The principle involved here, explains Mr. Crouch, is that lighting whether polarized or not, must be so arranged that a driver's line of sight does not travel along the beam of either his own headlights or of fixed highway lights.

The demonstration, which took place at the Pennsylvania State University, grew out of a series of studies begun by the Research Institute over three years ago.

Watertown Arsenal Develops New Shell Molding Practice

A low-cost sand bonding technique for shell molds has been developed by the General Thomas J. Rodman Laboratory of Watertown Arsenal. Bonding material for the process is waterglass which supplants resin-type bonding agents.

The mixture consists of five per cent waterglass, 2½ per cent water, and the remainder 120 AFS size sand; premixing is done cold. This product is then blown at 40 psi on a matchplate preheated to 420 F. As the wet sand builds up on the matchplate, it is distributed manually to an even ¼ in. thickness. It is then baked at 850 F for one to three minutes, depending on the size of the shell mold.

According to Philip Carbonaro, director of the laboratory, good definition and an improved surface finish has been achieved by the low-cost process. Thus far the laboratory has cast aluminum, brass, steel and nodular iron successfully in the new water-glass-bonded shell molds.

Inland Sales of Metros Increase 160 Per Cent

The pattern of distribution in the small-car field is beginning to change. The shift in sales throughout the country was noted recently by J. W. Watson, Metropolitan sales manager of American Motors, who observes that sales of the Metropolitan are broadening noticeably into inland areas.

Up to now the rate of increase in sales had been predominant in the East and West Coast and Gulf Port areas. The shift inland is pointed up in a report which shows sales of Metropolitans in the 29 inland states increased by more than 160 per cent during the first five months.

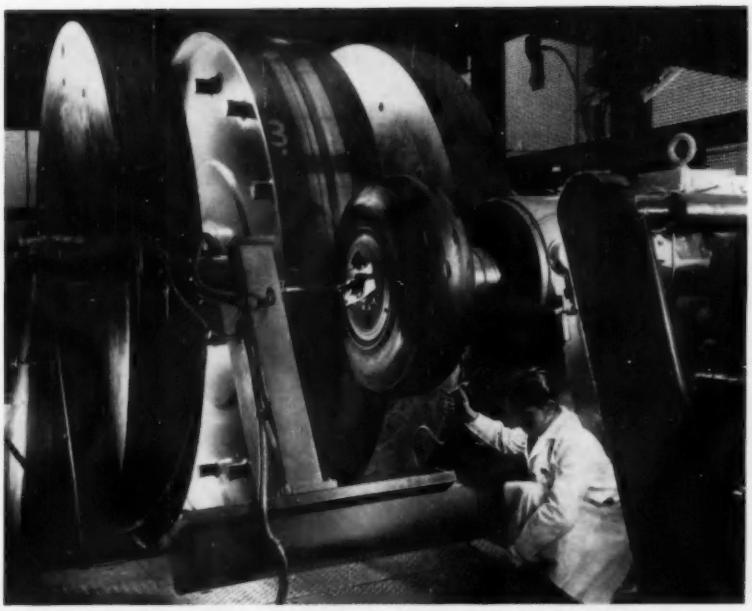
Sperry Award Honors GM Diesel-Electric

The 1957 Elmer A. Sperry Award will be given to three individuals and to four sections of the Electro-Motive Div. of General Motors Corp. for their work in developing the firm's Diesel-electric locomotive.

The award, established in 1955, is given each year for "a distinguished engineering contribution which . . . has advanced the art of transportation . . . by land, sea, or air."

Recipients of the award, according to Robert B. Lea, chairman of the Sperry Board of Award, are: Harold L. Hamilton, retired vice-president of General Motors and founder of Electro-Motive; Richard M. Dilworth, retired chief engineer of Electro-Motive; Eugene W. Kettering, now director of research, at Electro-Motive; and the controls, electrical engineering, locomotive, and mechanical engineering sections of the engineering department at Electro-Motive.

The awards will be presented formally during the 1957 Fall General Meeting of the American Institute of Electrical Engineers, at Chicago, on Oct. 10.



AIRCRAFT COMPONENTS TESTED ON BIG FLYWHEEL

Massive inertia flywheel simulates a runway for testing aircraft tires, wheels, and brakes. The wheel can be spun up to 560 rpm to represent a touch-down speed of 200 mph. Landing-gear assembly is then rammed against its rim by hydraulic pressure. Flywheel weight can be varied between 10 and 45 tons to represent from 3½ to 22 tons of aircraft weight per brake. The machine is used by Dunlop Rubber Co. in England.

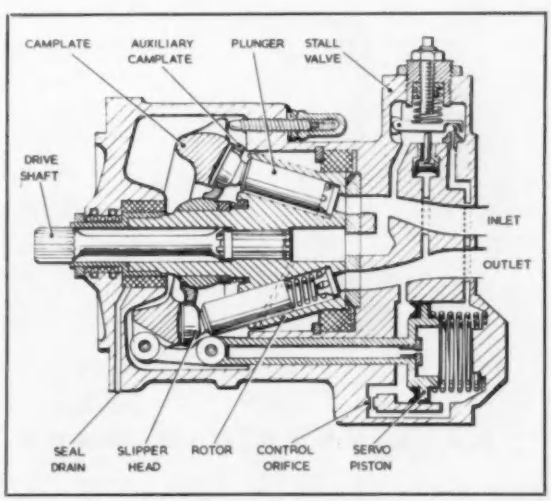
Ford and GM to Offer Air Suspension in '58

Air suspension will be confined to Ford and General Motors cars in 1958. It will be offered across the board on all Ford Motor Co. cars, including the Edsel, and is virtually assured for all GM divisions. Air springs will not be a standard item on any of the lower-priced cars. American Motors had been considering air suspension, but definitely has decided against it.

(*Turn to page 94, please*)

HYDRAULIC PUMP UNIT

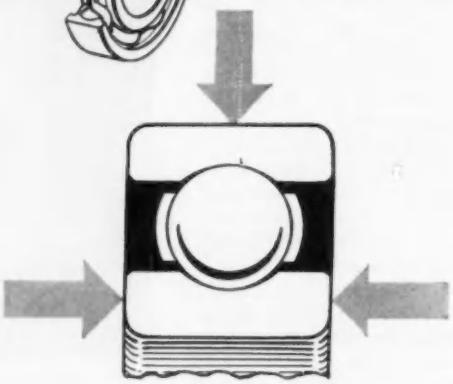
Hydraulic pump made by Lucas in Britain has automatic stroke and pressure control regulated by a servo piston. The swash-plate unit has seven plungers carried in a cylindrical rotor, and can handle fluids ranging from wide-cut gasoline to heavy oils. Operating on kerosene it develops a pressure of 3000 psi with a flow rate up to 1425 gph, and runs at a maximum speed of 3000 rpm.



FACTS

about

NEW DEPARTURE BALL BEARINGS



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Fits Like A Glove!

Fits because—this basic New Departure ball bearing, more widely used than any other antifriction type, does much more than carry RADIAL loads—it locates the shaft it supports against THRUST LOADS FROM BOTH DIRECTIONS equally well!

Fits because—with a simple snap ring added, it does away with inside housing shoulders, simplifying mounting and cutting machining costs!

Also—with efficient Sentri-Seal added, without change in exterior dimensions, it eliminates a separate outside closure—assures protection from outside dirt!

And—with Sentri-Seals on both sides, this same basic bearing does away with all separate seals, eliminates all need for lubricating fittings—requires no attention for greasing!

Finally—it is a long-lived, non-separable unit that calls for no shims or other devices for periodical adjustments.

So, specify New Departures of the type that assures you maximum application proficiency and economy.

BALL BEARINGS MAKE GOOD PRODUCTS BETTER

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

MEN IN THE NEWS

Cleveland Cap Screw Co.—Thomas A. Fribley has been named secretary and elected to the board.

Chrysler Corp.—**James W. A. Baubie** has been named director of public relations.

Moraine Products Div., General Motors Corp.—**J. Robert Lakin** has been appointed general sales manager.

Aeronca Manufacturing Corp.—**Eugene V. Gustavson** has been named director of engineering.

Fairey Aviation Co., Ltd.—**G. W. Hall** has been named chairman of the board.

Firestone Tire & Rubber Co.—**John D. Paulus** has been appointed public relations director.

Haynes Stellite Co.—**Robert M. Briney** has been appointed president.

Baker Brothers, Inc., Machine Tool Div.—**Robert T. Loudon** has been made sales manager.

R. M. Hollingshead Corp., Western Div.—**John O. Ham** is now production manager.

B. F. Goodrich Co.—**Clifford S. Farmer** has been named assistant controller.

Chrysler Corp., Stamping Div.—**George S. Aradan** was named divisional master mechanic; **John H. Davis**, divisional chief engineer; and **Ernest W. Marchand**, manufacturing manager for the Mack Ave. plant.

Chrysler Corp. of Canada—**R. J. Lyons** has become a director of product volume and planning.

Plymouth Div., Chrysler Corp.—**W. B. Revenaugh** and **C. C. Benedict** have been appointed assistant division comptrollers.

Lee Rubber & Tire Corp.—**Donald Strachan** has been made assistant to the president.

Kaiser Metal Products, Inc.—**Harold L. McKee** is now assistant to the vice-president.

Bullard Co.—E. C. Bullard was elected chairman of the board and chief executive officer, and E. P. Bullard, III, was named president and general manager.

Minneapolis - Honeywell Regulator Co.—**William W. Martenis** is now manager of semi-conductor activities.

General Electric Co.—**Howard W. Arnold** has been named manager of product planning and marketing research in the Metallurgical Products Dept.

National Lead Co.—**John J. Jennings** was made manager of the Metal Purchases Dept.

Westinghouse Electric Corp.—**Victor J. Kropf** is now sales manager for Atomic Fuel Dept.

Carpenter Steel Co.—**Richard L. Riegel** has been appointed advertising manager.

Philco Corp., Government & Industrial Div.—**Richard M. Fielding** is now manager of public information.

Rinshed-Mason Co.—**David E. Wilcox** has been appointed treasurer.

Robertshaw-Fulton Controls Co. — Thomas T. Arden has been elected president, and John A. Robertshaw has been named chairman of the board.

Chicago Pneumatic Tool Co.—James C. Mabe has been elected a vice-president.

Huber-Warco Co. — **Jacque Jones** was elected president.

(*Turn to page* 104, *please*)

Necrology

Ernest T. Weir, 81, retired chairman of the board and chief executive officer of National Steel Corp., died June 26, at Philadelphia, Pa.

Charles B. King, 89, retired automobile manufacturer (the King and the Silent Northern), died June 23, at Rye, N. Y.

James V. Connolly, 55, trademark cousel for Olin Mathieson Chemical Corp., died June 19, at New York, N.Y.

Maurice Goldenberg, 77, retired Detroit manager of the Truscon Steel Div. of Republic Steel Corp., died June 11, at Detroit, Mich.

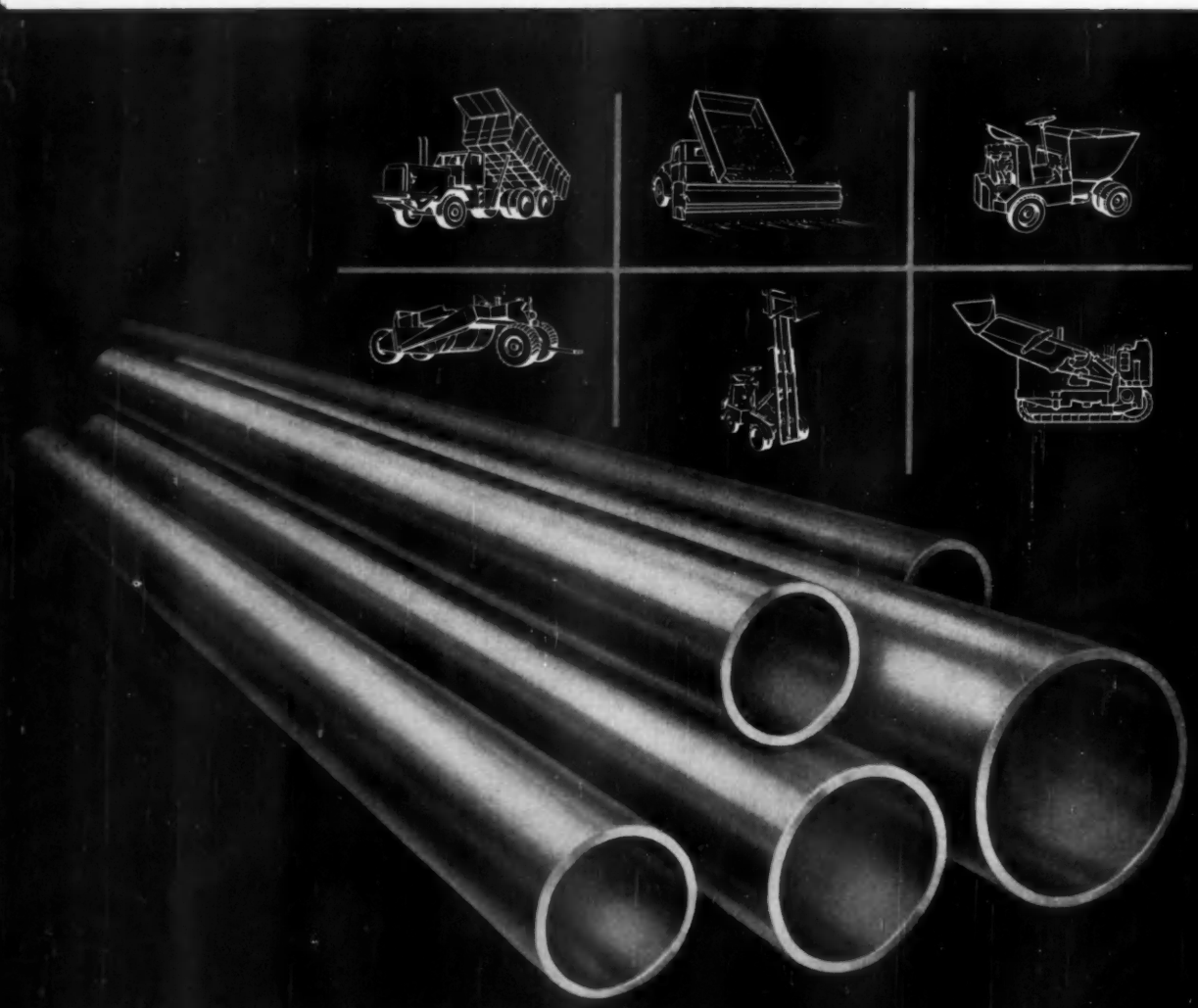
Henry W. Leland, 54, manager of media planning and research for the Advertising and Sales Promotion Dept. of the Apparatus and Sales Div. of General Electric Co., died recently at New York.

Charles Ford, 79, pioneer in pattern work for the automotive and aviation industries, died June 11, at Detroit, Mich.

John B. Dickson, 67, retired technical analyst for the Textile Div. of U.S. Rubber Co., died June 24, at New York, N.Y.

Roy P. Magarigal, 45, former sales manager of the Industrial Div. of Wilkening Mfg. Co., died recently, at Philadelphia, Pa.

Thomas M. Birmingham, 62, sales administration manager for Electric Auto-Lite Co., died June 26, at Toledo, O.



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B&W ERW Mechanical Tubing, with smooth I.D., can be delivered to you ready to use in hydraulic systems. Where inside surface is of prime importance and no stock removal is planned prior to application, this tubing is made for the job because it is furnished with a smooth inside surface having a guaranteed maximum average micro-inch finish.

In addition to smooth inside finish, this B&W Tubing assures you of uniform wall thicknesses, plus uniform and close I.D. tolerances. It combines light weight and high strength. It means long life and better performance in fluid systems for heavy duty or automation applications.

For complete information on B&W ERW Mechanical Tubing with smooth I.D., or on any tubing problem, call for Mr. Tubes—your direct link with B&W. Write for Bulletin TB-419. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

B&W
TUBULAR PRODUCTS DIVISION

TA-6102 M3

Seamless and welded tubular products, seamless welded fittings and forged steel flanges—in carbon, alloy and stainless steel.

How to detect and measure flange bending in gasketed joints

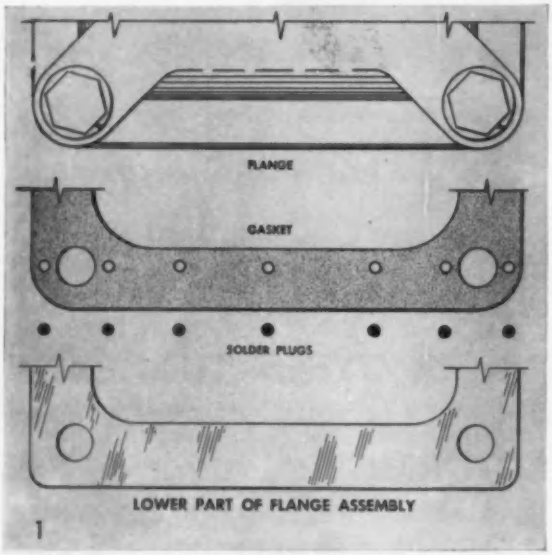
A surprisingly large percentage of gasket leaks is caused by almost undetectable bending or bowing that occurs between flange bolts, according to tests conducted at the Armstrong Research and Development Center.

Obviously, bending is most likely to be found where flanges are light, where bolts are widely spaced, or where bolting pressure is high. But it can also occur in heavy flanges, where bolts are not properly spaced.

Flange bending can cause leaks because it reduces the flange pressure on a gasket in the area midway between bolt holes and thus reduces gasket compression. Also, it may cause extrusion of the gasket near the bolts because of the concentrated pressure in these areas.

There are three qualitative ways and one quantitative way that an engineer can determine if flange bending is taking place.

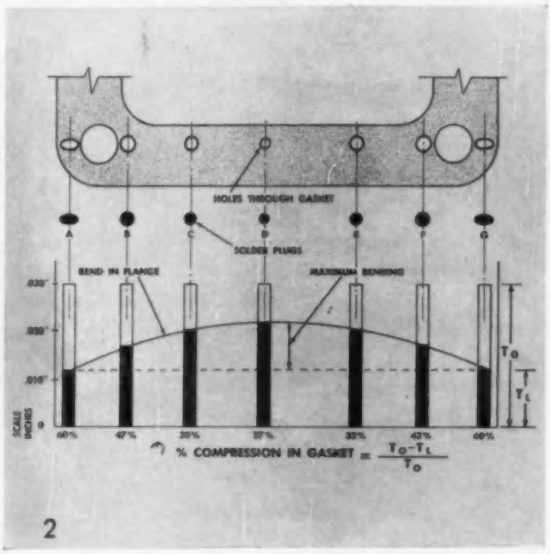
1) *Pinpoint the leakage.* If leaks originate at center points between bolts, there's good reason to believe that flange bending is the source of trouble.
2) *Look for localized extrusion.* Extrusion near bolts—and not at midway points—indicates that flange bending is present.
3) *Check for varying gasket adhesion.* Flange pressure is one of the factors causing gasket adhesion. Consequently, where pressure is greatest, greatest adhesion should occur. If upon opening a leaky joint the gasket is found to be sticking more around bolts than at center, flange bending probably is occurring.



1

TO QUANTITATIVELY MEASURE FLANGE PRESSURE or gasket compression at any particular point, a simple yet accurate "solder plug" test devised by Armstrong research engineers can be used.

Drill several holes about 1/32 inch in diameter through thickness of gasket to be tested. Insert in these holes cylinders or plugs of soft solder. (Fig. 1) The plugs should be thick enough so that when the flanges compress the gasket, the plugs will also be compressed. Put gasket with solder plugs into flange and tighten bolts to desired torque.



2

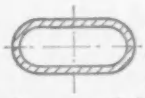
Open the flange and measure thickness of solder plugs. Each plug obviously will measure exactly the same as the compressed thickness of the gasket at the point where it was located.

The extent of flange bending can be shown graphically by charting the solder plug thicknesses. (Fig. 2) If too much bending occurs, gasket will be overcompressed around bolts and undercompressed between bolts.

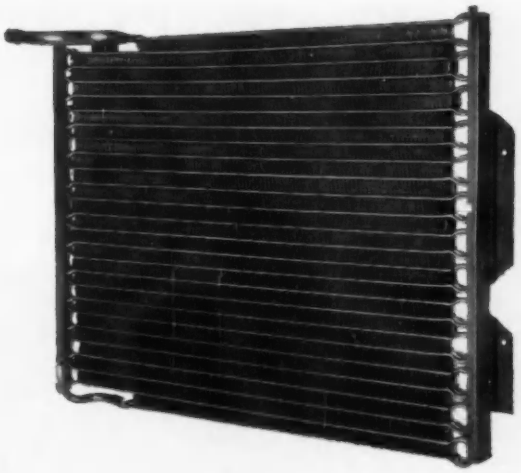
The percentage of compression can be easily calculated by using the formula in Figure 2. With this information, it is possible to determine whether the gasket material is within its recommended range at specific locations on the flange. The load-compression curves for the gasket material in question may be used to estimate unit loads. But these are relative unit loads and not absolute values. In addition, picking unit loads from load compression curves is applicable only to the compressible gasket materials such as cork composition.

Hot and bothered by tubing problems?

NEW GM STEEL TUBING "FLATTENED SERPENTINE" HELPS HARRISON COOL AIR BY THE CARLOAD



New Harrison Air Conditioning Systems for the '57 GM line use new "flattened serpentine" condensers of GM Steel Tubing. This exclusive development provides more contact area for a better bond, lets less tubing handle a higher heat-transfer volume . . . cuts size and weight, boosts efficiency and strength. It's another GM Steel Tubing "first"... and typical of the resourceful engineering service that's ready to go to work on *your* product problems. Check Sweet's Product Design File 1a/Ro, write us direct or call your Rochester Products Sales Engineer.



GM STEEL TUBING BY ROCHESTER PRODUCTS

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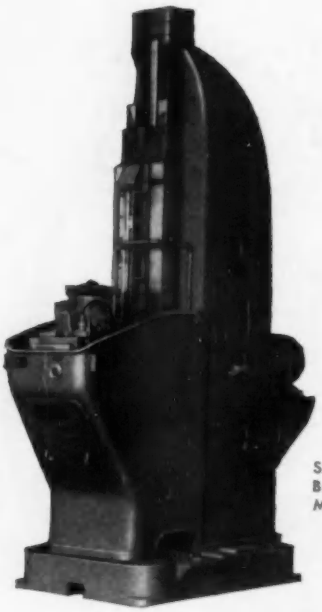

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Footburt Surface Broaching may be the answer to your problem of faster machining. Many jobs that were slow and expensive when handled by conventional machining methods are now being produced by Surface Broaching. Production in most cases is as fast as the speed at which parts can be loaded. Yet cutting speeds are so low that the cost of tool maintenance shows great savings. Exceptional finish can be maintained. We will gladly discuss your machining problems with you.

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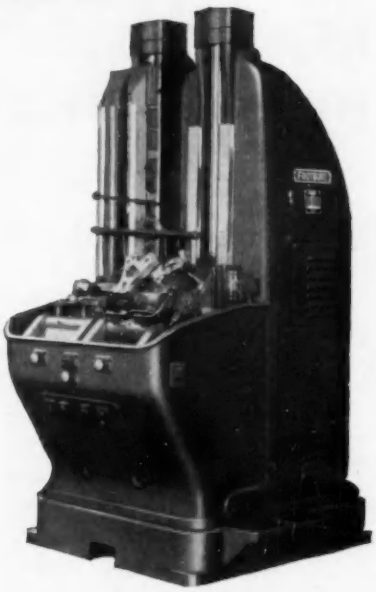
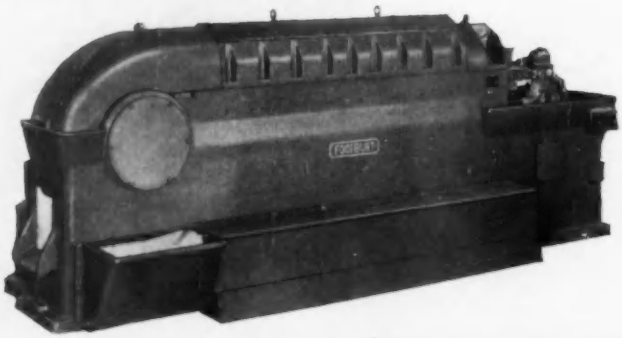


Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.



Continuous Type Broaching Machine. Made in 5 Sizes.

FOOTBURT

PIONEERS IN SURFACE BROACHING

Canada's Expanding Exports in the Aircraft Industry

By James Montagnes

CANADIAN military and commercial aircraft are now flying throughout the world. Canadian factories are now competing in world markets for aircraft sales and are busy with orders for aircraft and engines.

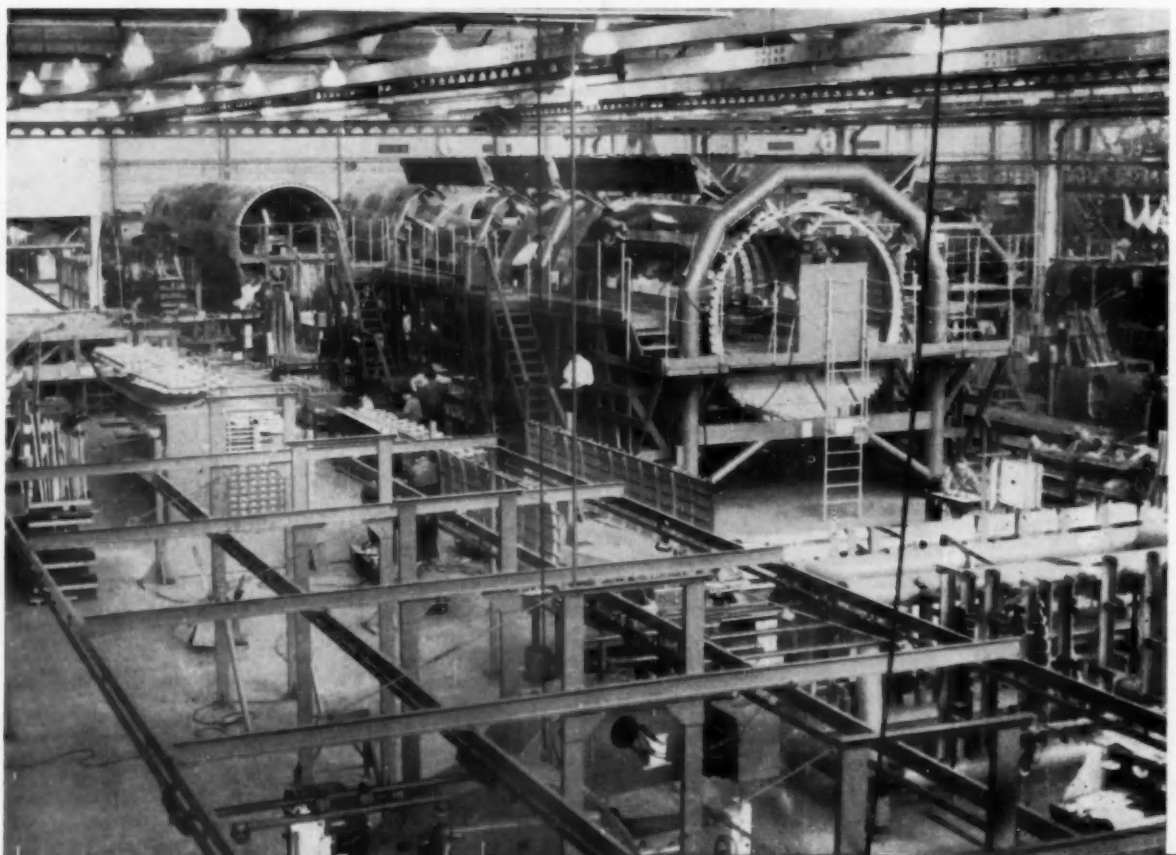
Canadian commercial aircraft have been in use in many countries for both commercial and military use for some years. The United States military services, as an example, are major users of Canadian De Havilland Beaver and Otter single-engined aircraft in all theatres of their operations. The United States Army has ordered new twin-engined De Havilland aircraft for use as troop carriers and ambulance planes. These aircraft are designed for short landing and take-off airfields.

Military aircraft in the past year have been exported by Canada for the first time to the air forces of South Africa, Colombia, Turkey and Greece, the latter two under North American Treaty Organization arrangements, the first two on direct orders from these countries. The aircraft, F-86 Sabre jet fighters, are made by Canadair Limited at Montreal, while engines are of Canadian manufacture by Orenda Engines of Toronto. Both companies are now working on an order of 225 aircraft for the West German Air Force.

While exports have been a major factor in production at De Havilland Aircraft of Canada at the Toronto plant for many years, exports are just beginning to come into the picture at other Canadian aircraft factories. Production for Canadian military purposes is still the major part of their work.

There are three main aircraft plants in Canada. At

A section of the Canadair Ltd. factory at Montreal, where fuselage of the CL-28 Argus reconnaissance plane is now in production.



Toronto there is Avro Aircraft Limited, a subsidiary of the British Hawker-Siddeley aircraft interests. This plant is now partly Canadian-owned, following a public stock issue last year. This company makes Canadian-designed aircraft, with current production of the CF-100 Mark V and VI, twin jet all-weather fighters, and production is now underway on a new supersonic delta-wing CF-105 Arrow which is designed to travel at about 1500 mph. First of the CF-105 aircraft is expected to be ready for test flights late this year.

These aircraft are in production for the Royal Canadian Air Force in Canada and at its European bases in West Germany and France. They are also being readied for export production, and negotiations are underway with a number of European and South American countries for purchase of the CF-100.

Also at Toronto is De Havilland Aircraft of Canada Limited, a wholly-owned subsidiary of the British De Havilland aircraft organization. This is the oldest Canadian major aircraft manufacturer, having been in Canada since 1928. Its postwar designed single-engined 6 and 14 place aircraft, Beaver and Otter, are in use in some 55 countries for freighting, feederline, charter and military flying. These aircraft, which have seen service during the Korean War as reconnaissance and ambulance planes, are in use in the Arctic and Antarctic with military and scientific expeditions.

Now De Havilland is starting on production of a twin-engined Caribou aircraft with capacity for 28 passengers and designed for take-off and landing in approximately 700 ft. The first order for these aircraft has been received from the United States Army and the Canadian Army is to test and evaluate the first aircraft to be produced. This aircraft has application also for civilian use, and is designed for freighting as well as passenger carrying service, with a range of 1200 miles. It will use Pratt & Whitney engines in first models, but later models are expected to use turboprops.

De Havilland is also producing at its Toronto plant an order of 100 Grumman CS2F reconnaissance aircraft for the Royal Canadian Navy. The first of these were delivered early this year, but the complete order is not expected to be finished till well into 1959.

Canadair Limited, a subsidiary of General Dynamics Corp., is the major aircraft manufacturer at Montreal. Like Avro Aircraft, the original plant was a Canadian Government factory in use during World War II. The plant has been considerably enlarged since it was bought by United States interests, and has built a number of different aircraft, all under license. Currently, it is in production of the F-86 Sabre 6, powered with an Orenda engine, for the RCAF and the West German Government. It is also in production now of the largest aircraft ever made in Canada, the CL-28

F-86 Sabres (in foreground) and T-33 Silver Star jet trainers, in the pre-flight hangar at Canadair Ltd., Montreal, where they were produced.

Argus, for the RCAF. This is a modified version of the British Bristol Britannia 100 passenger turboprop transport. The Canadian version will use piston engines and will be used for coastal reconnaissance work. A transport version, CL-44, with turboprop engines, has been ordered by the RCAF this year. Preliminary work on this aircraft has started.

In addition Canadair has arranged to build in Canada for the RCAF the American Sparrow air-to-air missile. A jet trainer is also on the drawing boards but no definite order has been received for this.

At Fort William, Ontario, another subsidiary of the British Hawker-Siddeley aircraft interests, Canadian Car Co. Ltd., will soon start building the American Beech T-73 jet trainer for the RCAF. This plant, which builds mainly buses, has been used in wartime and postwar years to build trainer aircraft.

While new and larger equipment is being continually installed at the various Canadian aircraft plants, new techniques of production are also being evolved. For example, at Avro Aircraft, a new method of stretch wrap forming magnesium has been designed, making use of existing equipment.

Magnesium, which is becoming increasingly important in the fabrication of high speed aircraft, can be formed by the same general methods used for other metals, except that an even heat has to be used. In working on parts of the new CF-105 supersonic fighter, magnesium is employed. Ordinary drop hammer and hydro press methods of forming magnesium parts were not found satisfactory.

Avro engineers use ⅛ in. thick aluminum form in making magnesium skins. A magnesium blank is laid on the aluminum form and secured with masking tape. This assembly is then wrapped in felt and enclosed in a polyvinyl-alcohol bag, which has an outlet for vacuum attachment and thermocouple. The magnesium is pressed down by hand to conform to the contour of the heavier aluminum skin as the air is being exhausted from the vinyl bag. Holding the magnesium prevents the felt and vinyl from being sucked between the two sheets of metal as the bag is being exhausted. The felt protects the vinyl from puncture at the edges and corners of the metal.

With air pressure holding the magnesium to the aluminum form, a thermocouple lead is attached to a temperature recorder to provide a record of temperature and time for the work load. The bag, with its contents and thermocouple and vacuum connections, is then placed in an autoclave with any normal bonding load, and pressures and temperatures are raised to normal bonding levels. On completion of the bonding cure cycle the assembly is removed from the autoclave, the brittle vinyl bag is stripped off, and the felt removed, leaving the magnesium skin properly formed. This is not a high production method, but has been found useful in short batch production. Avro engineers feel the process can be extended to the use of a heated fixture to set the magnesium to shape.

In addition to aircraft, Canada is also producing

(*Turn to page* 126, *please*)

A stretch wrap method of making magnesium skins has been developed at Avro Aircraft Ltd., Toronto. First, magnesium blanks are placed on a heavy aluminum form, taped to the form, then wrapped in felt and vinyl bag.

Photo shows vacuum exhausted vinyl bag, with aluminum form and magnesium blank, being placed in autoclave at Avro Aircraft for forming magnesium skin for aircraft.

Magnesium skin (dark metal) after it has been formed in autoclave against aluminum form at Avro Aircraft.

How Ford's Steel Division Protects Against Carbon Monoxide

By R. D. Byrom

Safety Engineer, Steel Division
FORD MOTOR CO.

CARBON monoxide is considered the most lethal gas generally encountered in industry. Accordingly, at Ford Motor Co.'s Steel Div., where so many employes work in an area where this deadly gas exists, the job of gas protection is a vital one.

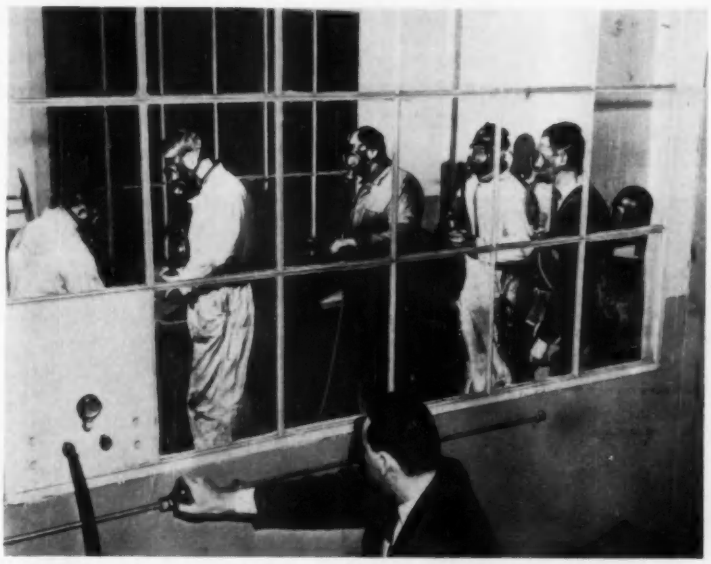
As little as 0.02 per cent will produce symptoms of gas poisoning in several hours. Twenty parts in 10,000 will produce unconsciousness in less than 30 minutes. The human body absorbs carbon monoxide into the blood 300 times faster than oxygen.

The Steel Div. Safety Unit has launched an ambitious three-phase program of gas protection. First is employe education. This phase of the program includes a gas school which has three rooms: a repair and storage room, where gas masks are kept ready at all times for emergency service; a classroom; and a gas room where employes wearing standardized oxygen breathing apparatus are conditioned to perform routine bench work under gas conditions.

As part of the educational program, all areas with recurring gaseous conditions are posted and, in many instances, fenced in or enclosed with cable. In addition, safety information and bulletins on first aid, gas detection, and case histories from other plants are distributed regularly to supervisors and are used as a basis for discussions at safety meetings.

The second phase of the program is gas detection. Everyone is made familiar with the physical symptoms of gas poisoning. In addition, gas detection is speeded by an M-S-S Colorimetric carbon monoxide tester that can be operated by anyone after only five minutes of instruction. An M-S-A carbon monoxide alarm can be set to sound a very loud horn on any carbon monoxide concentration ranging from as little as 100 parts to as much as 400 per million.

The third phase of the program concerns breathing apparatus used in the division. Oxygen in the loop system is better than 99 per cent pure. All oxygen equipment is dual purpose in design; it functions equally well as an integral part of gas maintenance activities or for rescue work.



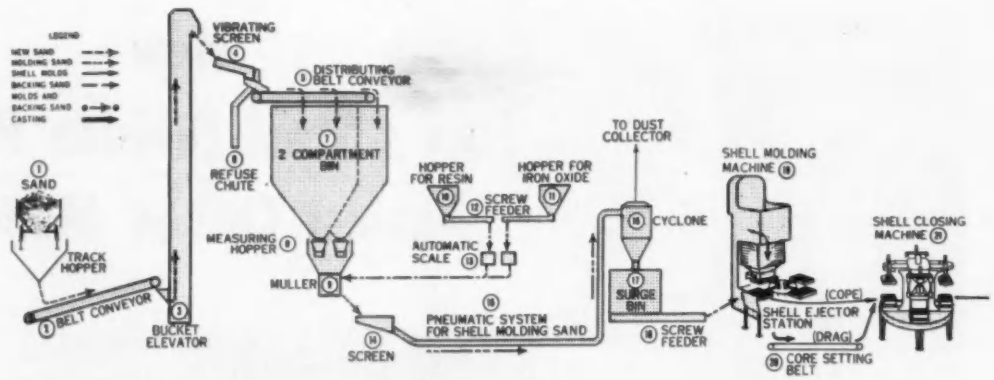
Employes at Ford Motor Co.'s Steel Div. gain actual experience working in a gaseous atmosphere in this air-tight room—part of the Division's school for gas safety

Three types of breathing apparatus are used in the division: an M-S-A demand oxygen mask, an M-S-A manifold-fed work mask, and an M-S-A Chemox mask. The total supply includes 44 demand masks with tanks, 85 work masks, and 7 Chemox masks.

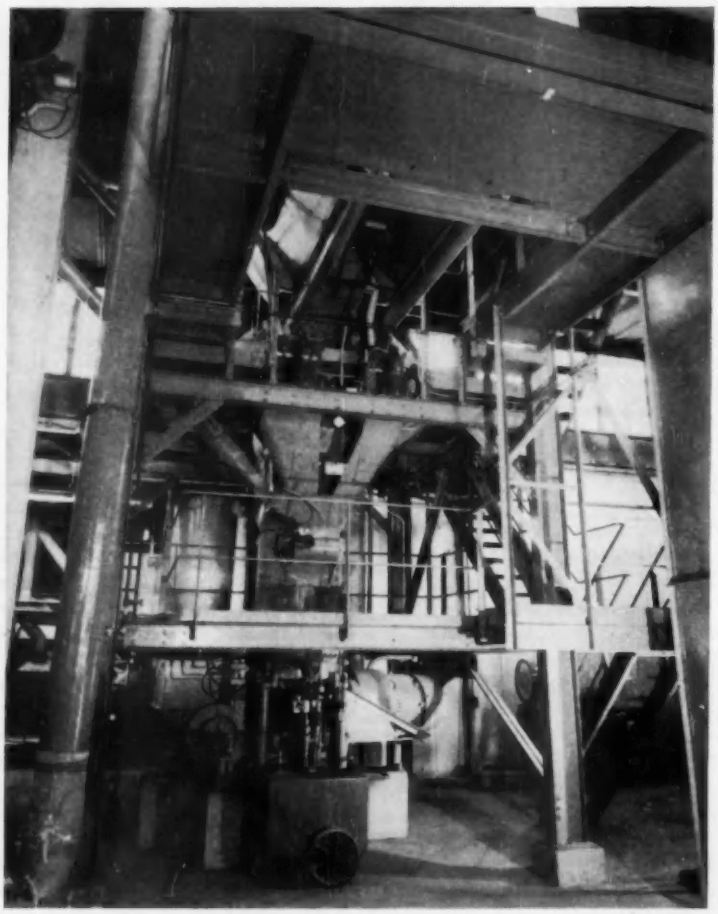
Special carts containing multiple lengths of hose, three oxygen tanks equipped with four-man manifolds, and a closed cabinet for sterilized work masks are stationed throughout the blast furnace and coke oven area. These carts are wheeled to the job site and the men simply adjust the manifold pressure, put on their masks and plug into the manifolds.

Additional sections of hose can be added quickly to any one work mask, since they are all equipped with quick-disconnects. This allows the workman to move as much as 100 ft from his oxygen supply. Actually, there is no reason why he can't work 1000 ft from his oxygen supply. The only limitation is that the employe must be sure that his lines are protected, and he must tie his regulator to his person in order to keep the mask from being torn from his face.

In areas where a workman cannot enter without a gas mask, such as on various levels of the blast furnace, permanent oxygen lines have been incorporated in the furnace structure. A five-man manifold is installed on each of the three rest platforms leading up to each blast furnace, as well as at the bell platform at the very apex of the furnace.



Shell Molded Crankshafts



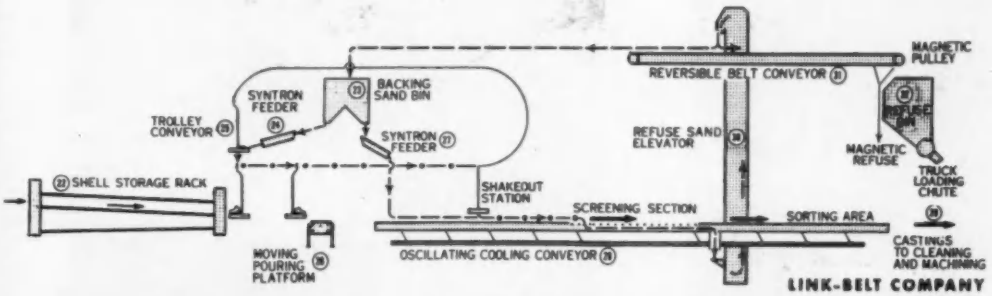
Sand is mixed with resin and cold coated in a muller

A PRODUCTION setup that is automatic to a high degree has been worked out for the recently-opened foundry in which Evinrude Motors Div. of Outboard Marine Corp. casts crankshafts. The foundry, located in Milwaukee, is now producing close-tolerance crankshafts that use less steel per piece than the forged crankshafts formerly used, and show savings in the elimination of some machining operations because of the close tolerances and good finish obtained with the molded pieces.

Metallurgically, the steel is more closely controlled for the castings than had been possible with the forgings. The foundry, using induction heating, is exceptionally clean. It was designed and built specifically for production of these crankshafts, which are cast in SAE 4615 steel. The design was worked out from results obtained with a pilot foundry set up and operated in 1954, when the feasibility of using cast steel crankshafts was proved also.

The handling and preparation of the sand is completely automatic. Screened and dried sand from Portage, Wisc., of 55-60 AFS fineness, is delivered to the foundry in covered hopper cars. It is carried into the plant on an 18-in. belt conveyor, lifted to a vibrating screen by a centrifugal discharge bucket elevator, screened, and then delivered to a two-compartment storage bin by belt conveyor. One compartment has a capacity of 100 tons, the other 50 tons.

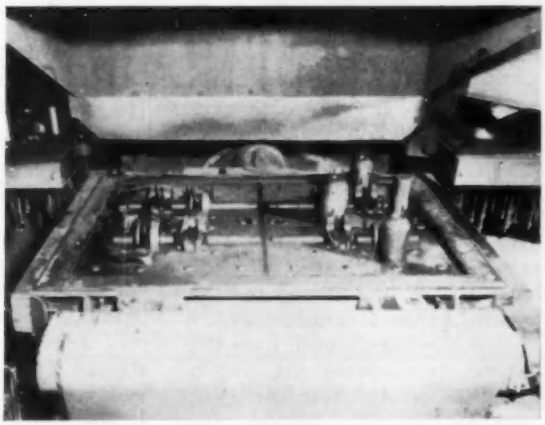
Sand preparation consists of running the sand into a muller through measuring hoppers at the



Flow diagram of the foundry

By Kenneth Rose

for Outboard Motors

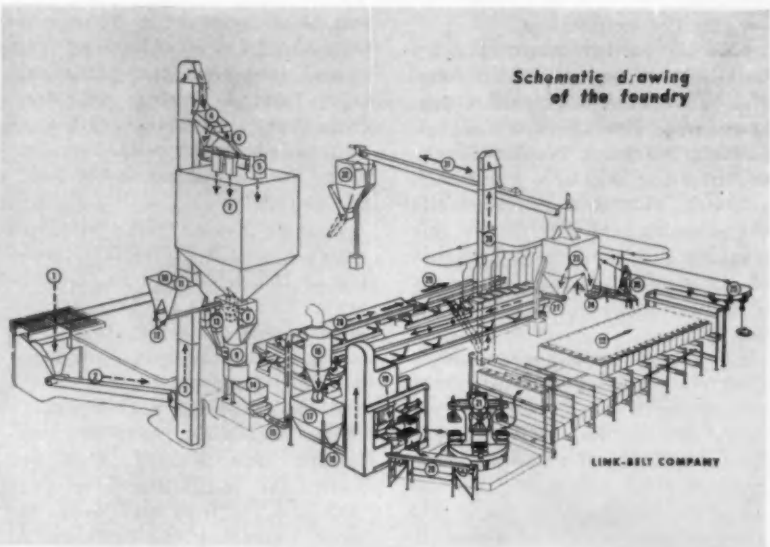


The pattern, both drag and cope, in position in the shell molding machine

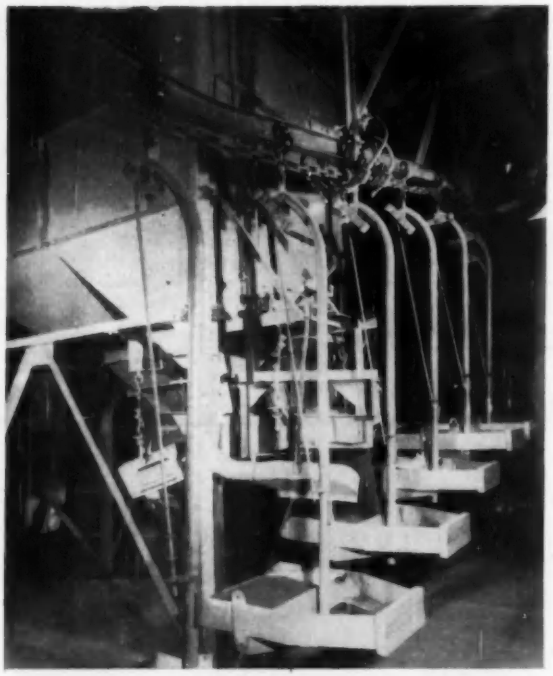
bottom of each storage compartment, and mixing the sand with a phenolic resin and iron oxide powder. An alcohol-water solvent is added partially to dissolve the resin and assist in the cold coating of the sand grains. About four per cent of resin is used, based upon weight of sand. After mixing in the muller, the sand-resin mixture is discharged onto another vibrating screen, then conveyed to the hopper of the shell molding machine. The mixing operations also are completely automatic. The system can provide about 2000 to 2500 lb of coated sand per hour.

The shell molding machine, supplied by Link-Belt Co., is a completely automatic four-station machine that can supply about 120 shells per hour. Shell size is 19½ in. by 29½ in. Cope and drag are made simultaneously, and closed on an automatic shell closing machine.

At the first station, the heated pattern travels into position, a flask is lowered onto it, and resin-sand mixture is sifted down from the hopper into the flask. The heat of the pattern causes a thin shell of resin and sand to form over it. After a predetermined time the pattern and flask are rolled over



Schematic drawing of the foundry



Backing sand is run into the trays of the pouring conveyor

The cleaned, heat treated casting. Little machining is needed

to spill out the excess mixture. The table of the machine then rotates to the second and third stations, where the shell is cured under a bank of infrared radiant heaters. At the fourth station the finished shell is stripped from the pattern automatically, the drag is placed on a flat belt conveyor, cores are set if necessary, and then carried to the shell closing machine. Adhesive is applied for bonding the mold halves.

The closing equipment, also by Link-Belt, is an automatic four-station machine in which the cope, transferred directly from the shell molding machine, is placed over the drag and held by a pneumatic-actuated clamping device while the adhesive sets. The rate of this machine is synchronized with that of the shell molding machine by a Link-Belt PIV variable speed drive.

Completed molds are removed from the closing machine and placed on a mold storage conveyor. Storage has 52 boxes, each with a capacity of 16 molds. When a box is filled with molds it is elevated automatically to one of two storage tiers, pushed off automatically, and rolls by gravity to the unloading end of the storage rack.

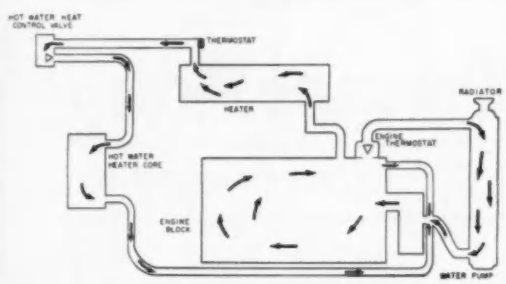
As the molds are needed, an elevator moves up to a preselected storage tier, a box of molds rolls onto it, and the elevator then carries them down to an inspection station. The box is unloaded, the molds inspected, and transferred to the pouring conveyor. This is an overhead trolley conveyor having 57 hinged trays 20 in. wide and 24 in. long, set on 32-in. centers. About 1½ in. of backing sand is run into each tray automatically from a Syntron vibratory feeder, and the molds are placed in this supporting sand. The conveyor then continues to the pouring station.

Pouring is done from a platform with a lever tilt trolley ladle, moving at the same rate as the conveyor. The molds are then carried on to either of two shakeout stations, where the trays are automatically tripped, and castings and sand are discharged onto a 36-in. oscillating conveyor containing some backing sand. Two additional oscillating conveyors take the castings and sand, the motion cleaning the castings. At the end of the third conveyor a screening section separates the sand and castings, the castings being finally removed manually into a wire basket for more cooling.

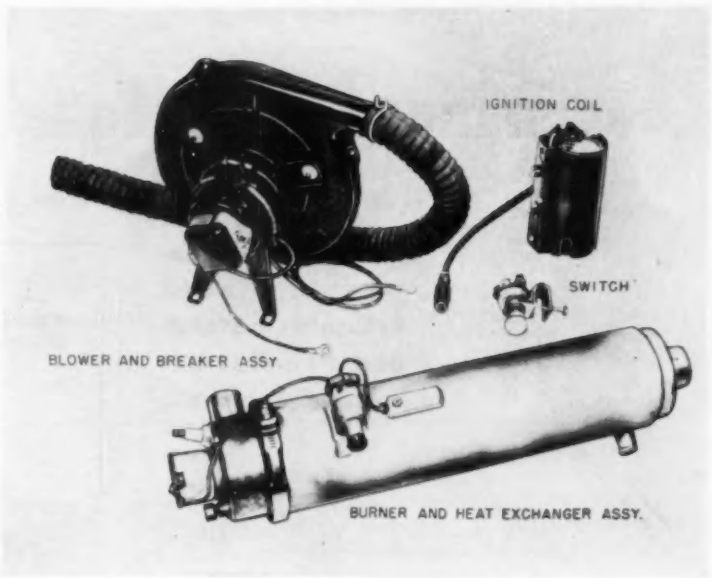
A high speed friction saw is used to cut off the gate sticks, the castings are shot blasted to complete the cleaning, and then loaded into alloy trays for a normalizing and draw treatment. Normalizing is done at 1750 F, with a draw at 1150 F. Sprues also are shot blasted, then returned to the furnace for remelting.

The foundry is operated by a force of 20 men. Four are employed at the shell molding and closing machines, one at the sand muller, one at the storage conveyor for loading the molds onto the trays of the pouring conveyor, five at melting and pouring, and one at the discharge end of the oscillating conveyors. Others are placed at the core machine, shot blasting, snagging, and heat treat operations.

Machining of the counterweights, formerly done with the forged shafts, has been eliminated.

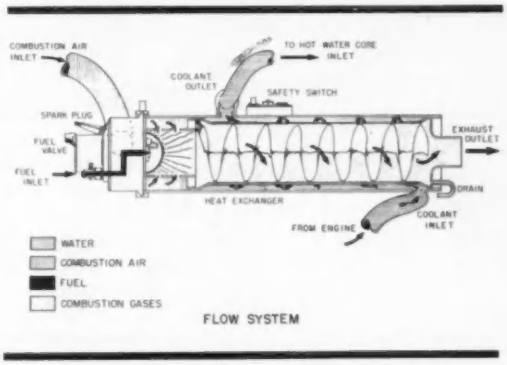


Minit Heater schematic flow system



Components of the Minit Heater

BOOSTER for Hot Water Car Heaters



Flow system through the heat exchanger

LATEST development in heating systems for cars, trucks and buses comes from the South Wind Division of Stewart Warner Corp. Called "Minit Heater," the device acts as a booster in connection with the conventional hot water heater, helps heat the coolant much more rapidly than the engine alone. It pours out 50,000 Btu/hr into the engine cooling system the instant the engine is started.

Designed for the after-market, the unit is adaptable to 1949 and later car models. At least three car companies are planning to offer the system for field installation this fall, including Edsel.

The unit consists of three assemblies, which can be mounted flexibly in the engine compartment—an atomizing type burner, a combustion-air blower and an ignition system. The burner consists of a stainless steel heat exchanger, fuel valve, spark plug, built-in thermostat, and coolant inlet and outlet connections.

An electric switch, mounted on the instrument panel, actuates the booster. A second control is employed to automatically shut off the system when temperature reaches the optimum 160 F and start it up when the water temperature drops below 140 F.

Square D Starts Operations At New $3.5 Million Plant

Square D Company last month marked the completion of its new $3.5 million manufacturing plant in Milwaukee. The 200,000 sq-ft unit, located on a 48-acre site, is designed for high-volume production and incorporates over 2000 ft of continuous conveyor systems. It is believed to represent the most advanced installation of its type in an industry which supplies the basic products for automation systems and related mechanized manufacturing operations.

In one section, operators at high-speed presses and tapping machines move parts directly to conveyor spur lines feeding onto a main line, which dips below floor level to avoid aisles and on into an elaborate heat-treating and plating center. In other areas, overhead conveyor lines move product enclosures through degreasing and painting operations to converge on a final assembly point; here, completed and inspected components arrive after progressing through various stages on movable belts.

Modern material handling equipment in the plant includes hydraulically-lifted shipping dock platforms, monorail crane systems, and electric trucks. Roller-type shelves that employ gravity to keep parts accessible and moving forward is an idea borrowed from new supermarket designs.

Combination Sparkplug and Pressure Pickup

New Device Measures Cylinder Pressures in Standard Production-Model Engines

FIG. 1
Combination sparkplug-pressure pickup, showing strain gage lead tube and connection

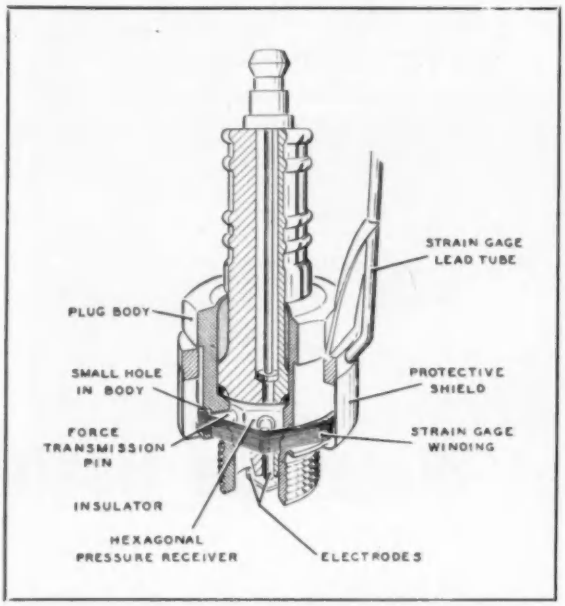


FIG. 2
Sectional view of sparkplug-pressure pickup combination

A PRESSURE sensing device built into a standard sparkplug provides a simple solution to problems of cylinder pressure measurement. The measurement of instantaneous cylinder pressures, as well as the ability to record pressures continuously throughout the working cycle, are important in the design of high-compression combustion chambers, ignition systems, and carburetors. Information on cylinder pressures is also useful in the study of detonation, cylinder wall deposits, and fuel performance.

The usual method of obtaining such data is to install a conventional pressure pickup through a tapped hole in each cylinder head of a test engine. The output of the pickup is then measured and recorded by laboratory instruments, while the engine is operating under various conditions of speed and loading. The resulting data are then refined and interpolated to correspond with the performance of standard production-model engines.

This method has one major drawback, however: it has been found that pressure records obtained from special engines having extra taps do not necessarily give an accurate picture of the performance of standard production engines.

Moreover, with higher compression ratio, cylinder heads have become more compact, leaving little room for test ports of any kind. In the case of new production models, the introduction of an additional opening in the cylinder head has become practically impossible because of the added complications in water jackets and valve mechanisms.

The logical answer to these problems is the combination of a pressure pickup and a sparkplug into a single unit (see Fig. 1). In the development of such a unit two configurations have been attempted by automotive researchers. The first of these was a tandem arrangement in which the center sparkplug electrode formed part of the pressure receiver of the pickup. The second device employed a parallel design in which pressure sensing elements were completely separated from the ignition elements.

Most attempts at a tandem design failed because the weight of an electrode mounted on the pressure

By Dr. Y. T. Li

DIRECTOR OF RESEARCH

DYNAMIC INSTRUMENT CO.

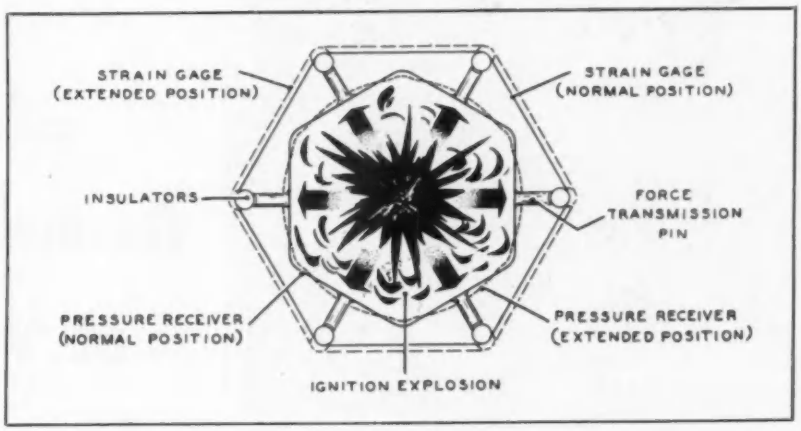


FIG. 3

Schematic cross section shows pressure receiver deflections under ignition conditions

receiver limits the dynamic performance of the pickup and increases its sensitivity to vibration. Another basic limitation of the tandem design is the poor heat dissipation of the center electrode. The insertion of pressure sensing components in series with the electrode and the sparkplug base interrupts the normal path of heat flow and effectively changes the thermal characteristics of the plug. Pressure data obtained from such a system requires interpolation to correspond with normal cylinder operation.

Figure 2 shows a sectional view of a parallel-type unit which avoids the above limitations. The main body of this device is an ordinary sparkplug. Electrodes are of standard size and are normally located in the plug cavity. The path of heat-flow from the center electrode is unobstructed through the insulator to the plug base. No significant amount of plug base material has been removed to interrupt this path.

A flexible pressure receiver in the form of a hexagonal sleeve is installed in the electrode cavity between the electrode and the plug body. Six small holes are drilled radially through the plug body perpendicular to the six flat surfaces on the pressure receiver. Pins are secured to each of these surfaces and project through the small holes in the plug body. Insulating terminals are attached at the ends of each pin and the strain-gage winding is stretched from insulator to insulator in several turns about the sparkplug body. Strain-gage leads are carried in a steel tube which supports an electrical connector several inches above the plug ignition terminal. A metal shield added to the outer plug body protects the strain-gage element.

In operation this sparkplug fires normally and does not alter the normal combustion cycle of the cylinder under study. Changes in cylinder pressure which accompany the firing and scavenging actions cause the six flat faces of the hexagonal pressure receiver to deflect like six small diaphragms, as shown in Fig. 3. These deflections are transmitted to the strain-gage element by means of the connecting pins. As tension on the strain-gage varies with diaphragm deflections, the strain-gage resistance changes in accordance with well-known laws. When excited by an appropriate voltage source, the strain-gage will thus provide a voltage output which varies in proportion to pressure changes in the engine cylinder.

Since the strain-gage element is located outside the plug body, many temperature problems are eliminated. To completely compensate for temperature variations, an additional winding may be added around the plug body. This second winding can be connected to balance out both temperature and induction effects in the active strain-gage coil.

Induction effects are particularly important in a magneto-type ignition system. A false cyclic signal may be introduced when the inductive balance between the strain-gage element and the auxiliary winding is inadequate. To check for such effects a blind adapter to receive the sparkplug-pickup can be mounted on the engine under test. By placing the pickup in this adaptor induction effects may be detected and eliminated before pressure measurements are made.

The unit shown in Figs. 1 and 2 can be used at normal engine temperatures without the need of an additional cooling system. Its dynamic response is sufficient to record most high-frequency pressure changes. Its resonant frequency is approximately 25,000 cps. This device thus permits direct and accurate pressure measurements and records on standard production model engines under normal operating conditions.

• • •

Timken to Construct Plant in Australia

The Timken Roller Bearing Co. will start construction soon on a $1.5-million bearing plant at Ballarat, Australia, about 50 miles from Melbourne. The new facility will have 30,000 sq ft of floor space and will be able to turn out 1 million bearings a year, according to William E. Umstattd, company president.

Elmer Schweitzer, manager of the firm's Zanesville operation, has been named managing director of the new facility, which will be known officially as Australian Timken Proprietary Ltd.

Output of the plant will be supplemented by bearing shipments from the U.S. This will make available to customers in Australia, New Zealand, and the Far East, company officials say, a complete range of bearing sizes.

Modern Assembly Methods at Volkswagen Hannover Plant

One of the three main press lines. Dies and supplies of sheet steel are stored in the ground floor below.

THE Volkswagen body and assembly plant for trucks and buses near Hannover, Germany, where construction from scratch began in January, 1955, started production a year later and has now reached its planned capacity of 400 units a day. With a floor area of a million sq ft, it is one of the most modern and best-planned factories in Europe.

Operations conducted there under one roof cover stamping, welding and painting, and finally assembly with the engines, gearboxes and axles that continue to be made at the main car plant at Wolfsburg, 50 miles away. Some 5600 people are employed on two shifts, of whom only 300 are administrative or clerical.

All vehicles are of the same basic design, and the range of models includes an 8-passenger bus, a pickup with 1800-lb load capacity, delivery van, cargo-passenger combination, and ambulance. In each case the entire chassis frame and body are fabricated from sheet steel stampings to form a complex integral box-like structure, including built-in ducts for ventilation and heating. This design, together with a rear-mounted engine, keeps the net vehicle weight almost down to that of the payload, and gives a between-axle cargo area with equal weight distribution on front and rear wheels.

While these unitary bodies have no stampings in common with the VW car, the same engine, transmission and axles are used. The 72.7 cu in. aircooled flat-four delivers 36 hp at 3700 rpm. To compensate for the increased weight, the drive wheels incorporate 1.4 to 1 reduction gears that lower the maximum speed to about 50 mph. Wheels are individually sprung by transverse torsion bars.

The ground floor of the plant is, in effect, the basement, and all machines are installed on the first floor. Incoming supplies of sheet steel are delivered directly to the lower level and stored beneath the appropriate presses, being raised by cranes as required. Most presses are used for more than one panel and some for four or five, so approximately one month's stock of each component is also held in the basement area, as are the various sets of dies.

Scrap metal from the presses drops via gravity chutes through the first floor directly onto two belt conveyors below the three main press lines. These carry the scrap to a rear corner of the building, where elevators raise it to the throat of a Lindemann baling press. Cubed bales weighing some 450 lb are then conveyed out of the building into waiting railway cars on an adjacent siding.

Presses are arranged in straight-through layouts, with considerable use of mechanical extractors and moving belts for work handling. Largest in use is a double-action Weingarten for the roof panel. Rated at a total of 1600 tons, it is employed for both stamping and cutting off, the dies being changed every four or five days. Since the roof needs a 67 by 152-in. panel, most of this sheet is bought in America, the German steel industry's output of wide strip being insufficient to meet the requirements.

The welding section features four main merry-go-round tracks, each with an endless line of jigs that circulate continuously during the build-up of its respective component. This system is claimed to effect a time saving of 25 per cent over stationary jigs.

The basic floor section is initially fabricated on a single Roth machine that spot welds the large corrugated panel to the supporting frame with cross-members. The flat bed carries two jigs on rollers that

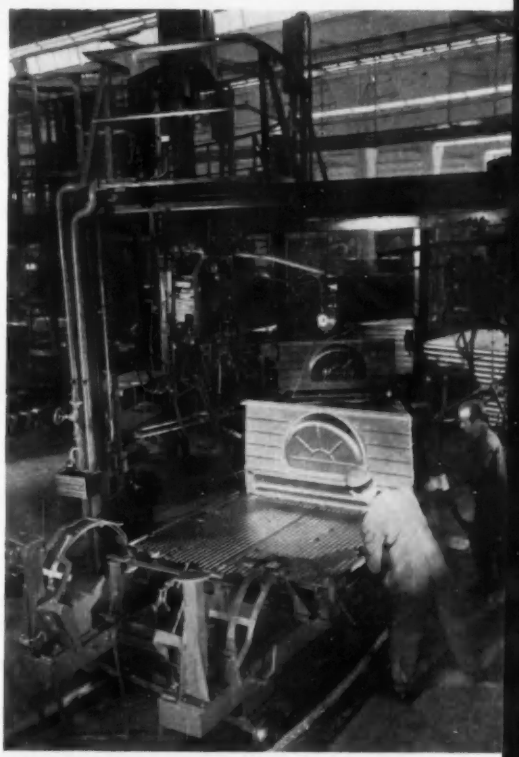
By David Scott

Corrugated floors are initially welded on this Roth machine. The two jigs index forward beneath the rows of electrodes that spot the panel to the frame, then return under the bed to the start position.

are returned empty beneath the track to the start position at the end of each complete cycle. After the frame is tacked together on a jig by two hand welders, the floor panel is clamped on top, and the remaining operations are automatic. A transfer bar engages the jig and indexes it forward beneath a transverse row of 18 double electrodes. The assembly steps ahead as each of the five ribs is spot welded to the corrugation troughs. At the same time the panel edges are welded to the longitudinal frame members by sets of shuttling electrodes.

The completed floor is then unloaded and placed on the adjacent start jig of the first circular welding line. Here, in 12 stations, the full floor assembly is built up with the addition of rear fender brackets, engine compartment cover, and cab rear panel with spare tire indentation. After completion, this unit is picked up by an overhead hoist and dropped on the nearby chassis line.

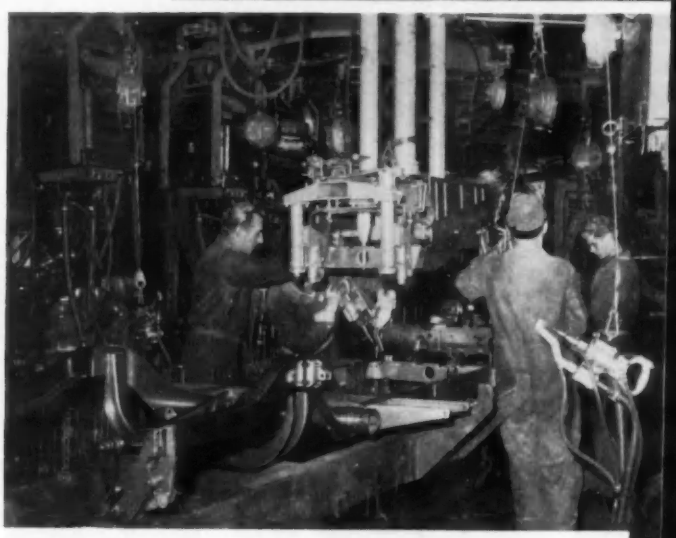
Meanwhile, chassis fabrication has been under way on the 41-station oval circuit. At the starting jig, lower components such as the engine-mounting arms, rear torsion bar housing and U-shaped cross-members are clamped in position. The main longitudinal frame beams and other heavier stampings are then located.



Floor sections are built up on the first 12-station circular line, where fender arches, cab rear panels, and other stampings are added

Overhead fixtures on hydraulic rams, rolling with the line on short sections of monorail, are used to drop and clamp parts such as the frame cross-members and the front seat support. Underfloor hot air ducting, brake tubing and other integral parts are now installed. All welding is done with hand guns. Halfway along the oval the floor sub-assembly is dropped on the chassis, permanent welding to which is simplified by rotating the trunnion-mounted jigs.

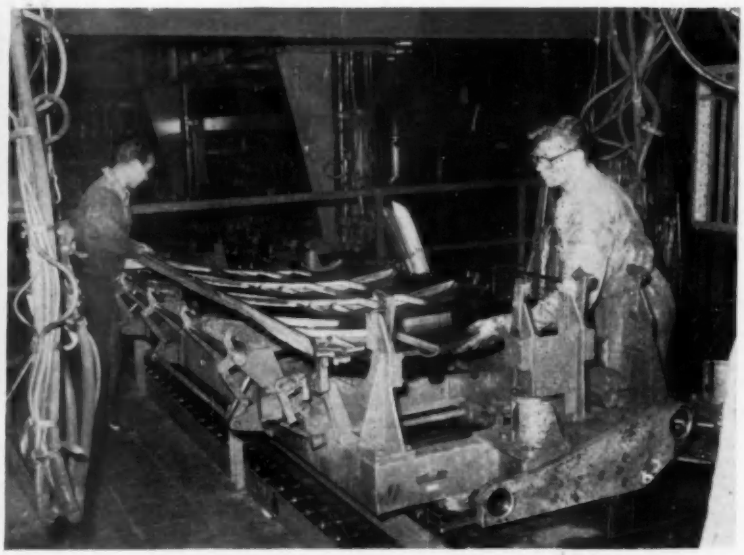
Up to this stage all assemblies are identical. When a drop-sided pickup truck is scheduled, the completed chassis-floor assembly is transported to a special 12-station circular line where the high-level 45-sq ft platform is added. This also forms the waist-high upper deck of the enclosed, between-axle load compartment.



Overhead dropping fixtures on hydraulic rams rolling on monorail are widely used on the chassis line for locating parts like frame cross members. The entire assembly is built up from stampings.

Perhaps the high point in mechanical handling at Hannover is the automatic mating of the body side panels to the chassis-floor. Left- and right-hand panels are built up on individual and parallel eight-station welding lines running on either side of, but in the opposite direction to, a straight section of the final 40-station oval line carrying the chassis unit. *(Cont'd)*

Side panels are initially welded on this VW-built machine that joins and braces the upper and lower stampings. The overhead fixture, holding the pre-assembled interior frame with magnets, has a rack-and-pinion drive.



Side panels are loaded onto the first jig of the appropriate eight-station line. Jigs are loosely located on the knee-high belts, and are mechanically removed later by transport arms that engage the larger holes at each end.

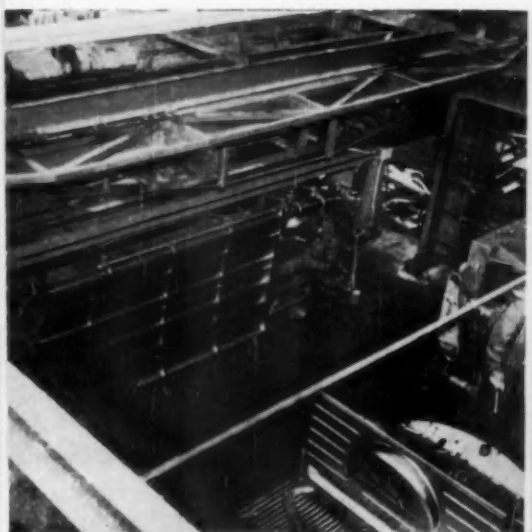
Before the panels are placed on these lines, however, the upper and lower stampings are joined and braced on a machine designed and built by Volkswagen. Here the two sections are placed manually on a roller-mounted jig, and the waist seam is spot welded with a hand gun as the carrier is pushed along the table by a second operator. The unit is then drawn back to its original position, and the prefabricated lattice of interior braces is loaded onto an overhanging fixture where it is held in a downward position by electromagnets.

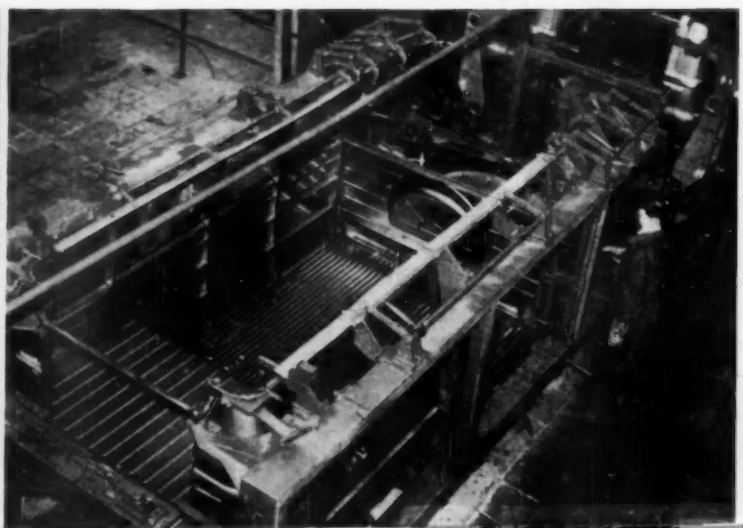
This frame is lowered by a rack-and-pinion drive so that the braces are pressed accurately against the joined panels; after which the magnets are released and the fixture retracts upward. The assembly is now rolled forward again into the main body of the machine, where the welding press unites the braces and panels with a total of 80 spot welds.

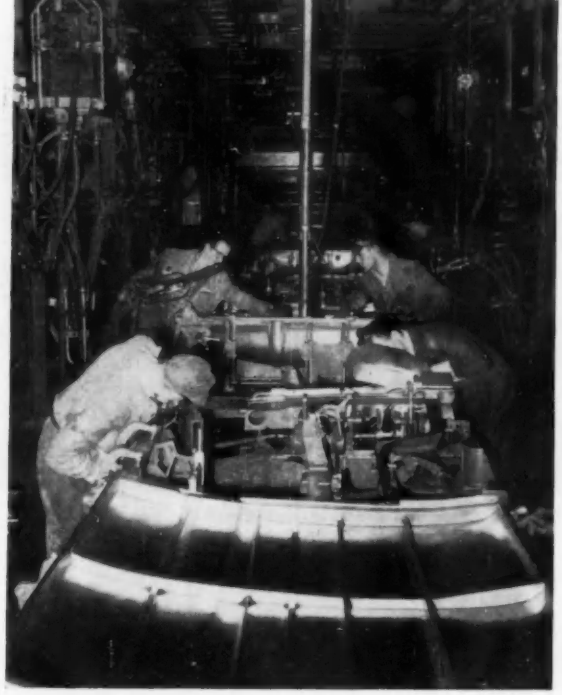
After removal from this machine (which handles both left- and right-hand components), the side panels are clamped in the first jig of their respective eight-station lines. These consist of knee-level conveyor belts on which the removable jigs are loosely located by large dowels. The main operations here are the adding of front or cab door frames and of curved rear-corner stampings.

While all side panels have the same basic dimensions, variations in vehicle models determine the number and location of windows and (in the case of the drop-sided pickup) the actual panel height. The universal jigs take these without alteration.

Meanwhile, completed chassis-floor assemblies have been conveyed by overhead monorail to the loading position of the final 40-station oval line, where they are clamped to the rail-mounted base jigs moved by underfloor drag chain. At the end of each side-panel







Fabrication of the side panels on one of the eight-station lines, where cab door frames and curved rear-corner stampings are welded on. The universal jigs accommodate all body types.

line, coinciding with the second chassis station, a pair of transfer arms picks up the loaded jig from the moving belt. This crane-like mechanism is carried on overhead tracks, and is capable of longitudinal, transverse, vertical and rotary movement. Large dowels on the two arms engage holes at the end of the jig in a pincer action during clamping and transport.

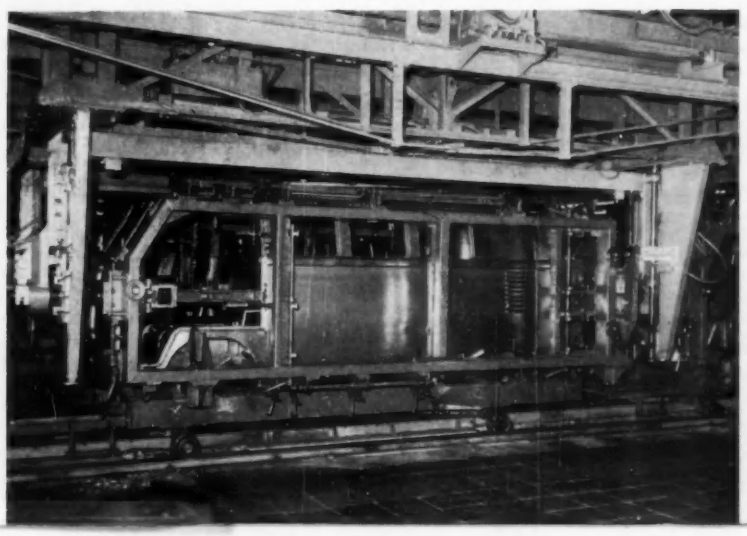
After the jig is picked up, it is turned through 90 deg from horizontal to vertical as the carrier moves it swiftly towards the underbody line. At the same time it is leveled vertically by hydraulic rams to match the approaching chassis, and its forward speed is synchronized with that of the oncoming conveyor. The two side jigs are simultaneously mated to the chassis jig during travel, after which they are quickly clamped by hand-operated toggles. The transport arms then withdraw from their jigs, and the two mechanisms return to their side-panel lines to repeat the operation.

At stations 3 to 8 of the oval line the side panels are welded to the chassis-floor. Side jigs are then released, and at the ninth station a second pair of transport arms picks them up and returns them to the start of each side-panel line. This equipment was built jointly by Fredenhagen, Offenbach, and Ziegler Industrie-Elektronik, Frankfurt. The complex movement sequences are controlled by 350 limit switches. Raw bodies are subsequently completed on this final circuit with the addition of the roof, front panel and doors.

Advanced welding methods are also used on other sub-assembly lines, such as the one for doors. This comprises four multi-spot presses which handle five different doors: left- and right-hand for the cab, the double doors on one side of the body, and the top-hinged tailgate. There is a total of 20 jigs and electrode sets that are changed periodically. These, together with finished doors, are stored on the main floor, since the productivity of this setup is high, and stock cycle runs for each type are therefore of short duration.

The first two welding presses for inner and outer panels attach interior bracing and hardware. These are linked by individual belt conveyors to the press which spots the two panels together. Work flow is then diverted to an adjacent mechanical press that clinches the flange, after which it is conveyed back to the line where the final machine series-welds the wrap-over. All presses are hand-loaded; but they incorporate ejectors that drag the work out of the jig onto the conveyor belt.

Completed raw bodies are finish-welded and ground on slat conveyors, where the considerable hand work necessitates three parallel lines. From there they are moved to the paint section at the extreme end of the building. After degreasing, bodies are fully Bonderized by dipping in a 9000-gal tank. Before complete sub-



FAR LEFT—
A left-hand panel for a delivery van closes in on the approaching chassis-floor. Longitudinal speed of the carrier is now synchronized with that of the main line, and height of its jig is correctly adjusted. All movements are automatically controlled by limit switches.

MIDDLE LEFT—
Both side-panel jigs are locked to the main jig with quick-acting toggles, and the two pairs of transport arms have retracted for the next cycle.

IMMEDIATE LEFT—
Side view of the body line, with the side-panel jigs being removed at the ninth station by a pair of transport arms. Subsequent welding operations on the 40-station oval circuit include adding the roof, front panel, and doors.

After painting, bodies are fitted with transmission, engines, and front axles on the shoulder-high assembly line at the right. These three components are circulated on a long overhead monorail loop. The three body finishing lines are at the left.

mersion, an operator sprays the roof interior to cover the area where air is normally trapped.

Carried from the gas-fired drying oven on a conveyor, the bodies enter the first automatic spray booth where primer is applied. Built by Schweitzer Equipment Co. of Cleveland, Ohio, this unit has three guns (on the top and each side) that are triggered into action by a photoelectric cell when an approaching body intercepts the light beam. As the body inches past, the guns with tilting heads are transversely oscillated by pneumatic cylinders so as to cover the exposed panels fully. An air conditioning system provides six changes of air per minute. Up to this point the paint line is in duplicate to handle the volume.

Oven-dried bodies are now wet-sanded on four lines, dried, and moved into four corresponding spray booths where filler is applied. In two of these booths Schweitzer equipment is used, supplemented by hand guns. Color selection takes place in the final four paint booths for lacquer, where again there are two Schweitzer units plus hand guns. Dried bodies for two-toning are masked with paper and returned through the appropriate booth. A total of 36 paint shades are in regular use.

Small components are painted in two continuous-flow tunnels built by Schilde. They are about 250 ft long, and are used for grey primer and black lacquer respectively. Wheels, bumper supports, mounting brackets and many other parts go through the black line, while all body panels shipped out as spares get the grey. The automatic two-hour sequence, involving no men inside the enclosures, covers dipping alternated with drying for degreasing, Bonderizing and priming, with final spraying for the black.

Painted bodies are conveyed back to the final assembly area in the center of the floor. There they are placed side-by-side on a shoulder-high conveyor, where electrical equipment and wiring is first installed. The transmission unit with rear axles, carried on a hand-leveled dolly, is then attached to the pair of trailing chassis members, requiring only two bolts. The engine is now fastened to the gearbox (four bolts). Simultaneously the front suspension and steering assembly are located on the other end.

These three major components, brought from Wolfsburg by rail, are loaded at random on an endless chain conveyor that extends down to ground level at one corner of the building. The overhead monorail, serving also for storage, circulates continuously past the pick-off point on the assembly line, where units are removed as required.

The final lap is the three parallel body finishing lines, plus a carpentry section for ambulances, of which about four are fitted out daily.

The production line ends with a novel setup for testing body sealing. Vehicles are first driven through an open-ended spray booth, where dozens of water jets probe every likely crevice in the door, window and panel joints. As each vehicle emerges it is bounced slowly over a seven-inch hump in the guide track, tilting it first backward, then forward, to drain off surplus water in the roof gutters and window sills. The driver then reaches through the window to switch on the compressed air, which blasts at 90 psi through pinholes in vertical pipes on either side. As the vehicle moves slowly past it is virtually blown dry. The entire sequence takes only two minutes.

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Chrysler Team Wins 1957 Styling Award

Chrysler Corp. stylists were awarded the Gold Medal of the Industrial Designers Institute at the organization's Seventh Annual Award Luncheon in Chicago. The Chrysler team, headed by Virgil M. Exner, the firm's director of styling, was commended "for establishing continuity of design in the company's five lines of 1957 cars while maintaining separate design indentity for each individual line."

Sharing honors with Exner in the award were Cliffor C. Voss, chief of exterior styling; Henry T. King, chief stylist for Plymouth, Dodge, and special bodies; Harry T. Bannister, chief of product development—styling; Robert E. Bingman, special products; and Carl Reynolds, chief of interior design.

Upward Trend *in* Farm Equipment Sales

By Kenneth Rose

WITH the first half of 1957 gone, farm equipment manufacturers have been taking stock of the business situation and studying the outlook for the remainder of the year. Reports show sales of their products running about 10 per cent above sales for the corresponding period a year ago, and while most of the equipment manufacturers would like to see it still higher, they are satisfied that the trend is upward.

Conditions Poor in 1956

The year 1956 was not a good one for sales of farm equipment. Most dealers had seen inventories building up as sales slowed. The southwest was in the grip of the most severe drought in its history. Farm prices were generally unsatisfactory to the farmer, and the outlook for Government support was unclear. Production of wheeled tractors, often a good barometer of farm equipment business, had run ahead of sales to the extent that about 107,000 tractors were turned out in the first four months of the year. As inventories mounted, production slowed so that the remaining eight months saw only about the same number of tractors produced. The yearly total was only 215,000 farm-type tractors.

In the first four months of 1957, production of wheel tractors was only 94,000. If sales should continue at the levels indicated — about 10 per cent above last year's —a total of 237,000 tractors will be produced during the year. This means that tractor production will average about 18,000 per month for the remainder of the year, or about 5000 per month higher than in the latter months of 1956.

Non-Uniform Business Level

The business level is not uniform among all the farm equipment manufacturers. One of the large producers reports sales of farm equipment down sharply during the first three months of 1957, with his dealers selling more than they were buying. Tractor sales, he reports, were slightly above those of a year ago, but here too dealers were reducing inventories. Sales of all types of farm equipment were much improved during the latter part of the six-month period, and the lowered amount of equipment in the hands of his dealers indicates still more improvement during the coming months.

Dealers' Inventories

Just when the upturn in sales began seems to have depended to a considerable extent upon the dealers' inventories. One large manufacturer reports that the upturn began last December; another saw little improvement before about April. Heavy spring rains have delayed some farm work, but with the improved moisture situation generally, and the end of the drought in the southwest, the steady upward trend is expected to continue throughout the year.

More Cash Receipts for Farmers

In support of a general expectation that sales for the second half of 1957 will continue at about 10 per cent above those for the same period last year, manufacturers point out that farm equipment sales are closely related to cash receipts from farm marketings, including Government payments. Most of the payments for crops, and Government payments under agricultural plans, are made during the second half of the year.

A favorable sign also, the Department of Agriculture's Index of Prices Received by Farmers has shown steady gain, both from month to month, and over the corresponding month a year ago. Recent figures are:

Index of Prices Received by Farmers

Month	1957	1956
May	243	240
April	242	235
March	237	228
February	234	227
January	238	226
	1956	**1955**
December	237	222
November	234	224

Department of Agriculture statisticians report that the realized net income of farm operators was $11.8 billions in 1956, an increase of four per cent over 1955. The realized net income is likely to show some further improvement in 1957, they say.

● ● ●

Jervis B. Webb Takes Over Spanmaster Crane and Plant

Jervis B. Webb Co. has purchased the Spanmaster Crane Co. with the manufacturing facilities in Los Angeles, Calif. Webb has also acquired 34,000 sq ft of manufacturing facilities in Detroit.

The Detroit plant provides production and office space to meet the requirements of Spanmaster customers located in the northeastern section of the U. S. In addition, the southern area of the country will be serviced by Spanmaster manufacturing facilities in the Webb of Georgia plant located in Atlanta, Ga. All three plants of the Spanmaster Crane Division will manufacture cranes and monorail systems to 10-ton capacity.

TABLE IV

Company	Product	Investment (U. S. $1,000) Foreign Direct Equity	Foreign Financing

The Brazilian Motor Vehicle Industry

By L. M. Peppercorn

PASSENGER cars are still imported into Brazil and may continue to be for quite a while, because the Government is more interested in the development of truck and jeep fleets through local manufacture. Under the special government plan to attract foreign capital for the manufacture of motor vehicles in Brazil, several of the world's large automotive companies have, over the past years, set up truck and jeep factories in Brazil. These include General Motors, Mercedes Benz, Willys Overland, Volkswagen, Auto Union and Ford.

Any plan to manufacture motor vehicles in Brazil has to be approved by a special government commission, but the conditions under which foreign investments are offered are so attractive that about $100 million will be invested in Brazil in this industry over the next five years.

A clear picture of the large investments that have been and will be made in this industry is presented in Table I which shows the exchange commitments expressed in dollars for the automobile industry from 1956 to 1964. Although the table includes the commitment of foreign exchange to import parts to supplement local manufacture only until the year 1961, the foreign exchange commitments for the "repayment of loans for equipment to manufacture parts in Brazil" goes until 1964.

Table II indicates the foreign exchange commitments per company with the exception of Volkswagen, which plans to make small delivery trucks. Vemag will also engage in the manufacture of delivery trucks.

The motor vehicle industry's program for production from 1957 to 1960 for trucks, jeeps and utility trucks is shown in Table III. This program shows that the vehicle industry in Brazil will increase its program during the next few years from a total pro-

TABLE I

Year	For Capital Equipment	For Parts and Components	Total
1956	$ 47,500	$ 5,245,892	$ 5,293,482
1957	835,119	45,003,267	45,828,386
1958	2,602,966	52,173,512	54,776,488
1959	2,498,823	39,258,986	41,754,609
1960	2,903,587	26,514,123	29,417,710
1961	2,824,589	8,956,994	11,781,583
1962	2,656,994		2,656,994
1963	1,934,629		1,934,629
1964	542,442		542,442
Total	$16,843,550	$177,152,774	$193,996,333

TABLE II

Company	Product	Currency	Total Commitments through 1964 (U. S. $)
General Motors do Brasil	Trucks	U. S. A.	$ 63,000,000
Fabrica Nacional de Motores SA	Trucks	Italy	59,592,674
Mercedes Benz do Brasil SA	Trucks	German	38,089,798
Willys Overland do Brasil SA	Jeeps	U. S. A.	21,287,725
SOFUNGE	Foundry and Forged Parts	U. S. A.	3,235,054
Vemag	Jeeps	Germany	5,332,325
Fabrica Nacional de Vagoes	Chassis and Wheels	U. S. A. and German	2,811,408 388,914
Metal Leve SA	Pistons	German	289,354
		Total	$193,996,332

TABLE III

TRUCKS

Year	G. M. HD 6503	Ford F-350	Ford F-600	Mercedes Benz L-312	Mercedes Benz LP-312	Fab. Nac. de Motores FNM	Total
1957	5,370	—	6,000	3,050	1,430	3,600	19,450
1958	9,780	1,000	8,000	4,770	2,310	4,200	30,060
1959	20,190	2,000	13,000	6,140	3,060	6,600	50,990
1960	29,460	2,200	21,800	6,140	3,060	7,200	69,860
Total	64,800	5,800	48,800	20,100	9,860	21,600	170,960

JEEPS

Year	Willys Overland	Vemag (DKW)	Total
1957	8,900	1,200	10,100
1958	12,950	2,700	15,650
1959	15,000	3,500	18,500
1960	15,000	4,500	19,500
Total	51,850	11,900	63,750

UTILITY TRUCKS

Year	Ford F-100	Vemag (DKW)	Volkswagen (Kombi)	Total
1957	2,250	2,400	4,000	8,650
1958	3,000	2,700	5,500	11,200
1959	4,000	4,000	7,000	15,000
1960	6,000	5,000	9,000	20,000
Total	15,250	14,100	25,500	54,850

duction in 1957 of 38,200 vehicles to 109,360 vehicles in 1960.

Until December 31st, 1956, production projects of motor vehicle parts were approved by the Government's special commission for the companies listed in Table IV.

The special Government commission also approved, until January 30th, 1956, a number of projects for motor vehicle production. These are shown in Table V.

Although the Government seems to be well on its way to promote a local vehicle manufacturing industry, roads are still the great probelm. The road from Rio de Janeiro to Belo Horizonte, in the state of Minas Geraes, was opened recently, but many more will have to be built. However, road building is part of President Kubitschek's program during his present administration. Many of the trucks now in production will have to replace old and worn vehicles, but many will also be used to improve transportation which is one of the biggest problems in Brazil.

TABLE IV

Company	Product	Investment (U. S. $1,000) Foreign Direct Equity	Foreign Financing
Metal Leve, S. A.	pistons	—	200
Fabrica Nac. de Vagoes, S. A.	chassis frames	—	2.748
Soc. Tec. de Fundicoes Gerais, S. A.	foundry parts	—	2,700
Radiator Ind. E. Com.	radiators	55	—
Metalurgica Mazam, S. A.	foundry parts	300	—
Borg & Beck de Brasil, S. A.	clutch plates	477	—
Retifica S. Paulo Ltda.	bronze bearings	118	—
Cobrasma	axles	882	8.939

TABLE V

Company	Product	Production in 1960	Investment (in U. S. $1,000) Foreign Direct Equity	Foreign Financing
Willys Overland	Jeep	15,000	3,500	1,300
Vemag (DKW)	Stationwagen	5,000	420	—
Mercedes Benz	Truck	9,200	8,600	—
Vemag (DKW)	Jeep	5,000	400	100
Volkswagen	Stationwagen	9,000	3,500	—
General Motors	Truck	29,460	10,000	—
Fabrica Nacional de Motores	Truck	7,200	—	6,500
Ford	Truck	30,000	16,000	—
Total	—	109,360	42,420	7,900

Nickel Sulfamate Bath for Stress-Free Plating

By Edward Calderon
PROCESS ENGINEER
Ryan Aeronautical Co.

A NICKEL sulfamate bath, which includes the characteristics of stress-free deposits and high tensile strength is used extensively in nickel plating operations at the Ryan Aeronautical Company's Engineering Laboratories. Using a metal "build-up" obtained from the bath, Ryan chemists have salvaged valuable components, which otherwise have been unusable, for afterburners, ramjet and rocket engines fabricated from stainless Inconel-X and alloy A-286.

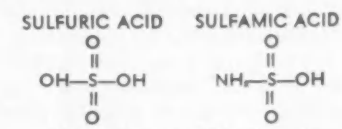
Nickel deposits from the nickel sulfamate electrolyte have in general a very fine grain structure, resulting in deposits that are smooth, ductile, and have a slight sheen in appearance. The color is much whiter than any deposits containing chloride, thus indicating a higher purity of nickel without chlorine inclusion. Tensile strength ranges from 60,000 psi to 130,000 psi, depending upon the conditions under which the bath is operated. Correspondingly, ductility ranges from 30 per cent elongation in two inches to a low of 6 per cent elongation at a hardness of 550 Vhn. Hardness can be controlled within the range of 200 Vhn to 550 Vhn with reproducibility by varying the operating conditions.

When depositing nickel under compressive stress, the nickel sulfamate bath exhibits exceptional leveling power. Brush surface analyzer measurements have indicated a reduction in surface roughness from 120 microinches rms to seven microinches rms for a plate 5 x 10^{-4} inch thickness.

It has been conclusively proved that plated coatings containing tensile stress cause premature fatigue failure from stress cracking. Since the majority of fatigue failures originate at the surface, any weakness of a surface condition can be detrimental to metal life under fatigue conditions. The aircraft industry, in particular, is concerned with effects of plated coatings upon reduction of fatigue strength of steel. Watts or chloride nickel plating baths rendering deposits with high tensile stress, can cause as much as 46 per cent reduction in the fatigue strength of underlying steel. Nickel deposited compressively by the bath under discussion causes no strength reduction and in some cases improves fatigue strength.

The most important phase of buildup work lies in bringing undersize production parts or worn-out machine tools up to correct size again. With the paramount present-day problems of material scarcity, is becomes necessary to salvage parts.

Sulfamic acid, used in the bath, is a white, crystalline, inorganic solid. It is non-hygroscopic, and non-volatile. In addition, it may be safely and conveniently handled and stored which should be of great interest to safety engineers. In strength, it is very similar to sulfuric acid, as is its chemical nature. The difference between their structural compositions can be illustrated as follows:



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An Objective Approach

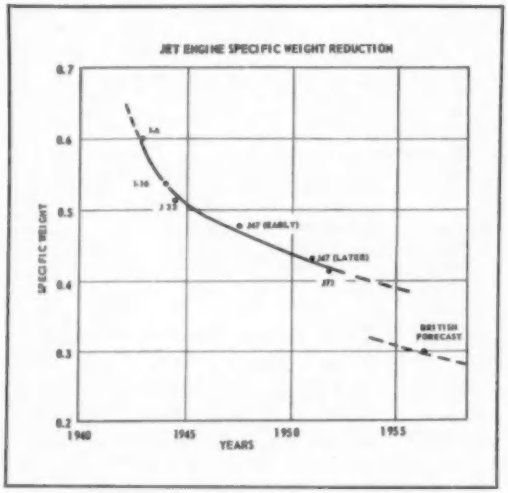

Fig. 1—Progress by General Electric in reducing the specific weight of jet engines. Continuation of this trend requires a planned weight control program as described in this article.

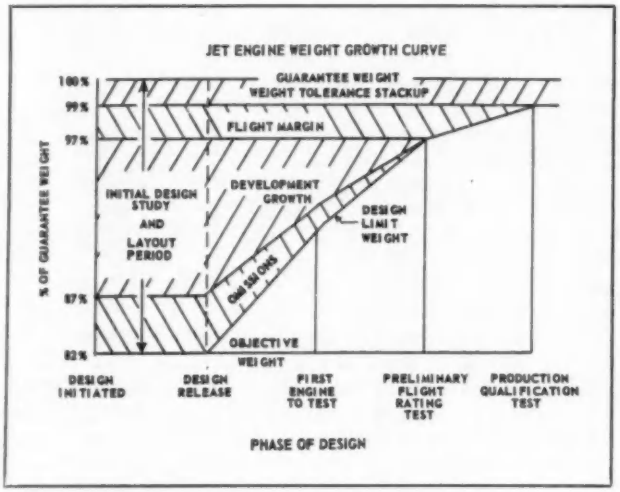

Fig. 2—Projected weight growth of a jet engine during its development cycle. A continuous yardstick for measuring design status and forecasting ultimate weight is provided by the design limit line.

IT is estimated that each pound of aircraft component weight results in a 10 to 20 lb. increase in the airplane "fly away" weight. This makes it obvious that light weight engine design is of paramount importance to the aircraft industry.

During the past 15 years considerable progress has been made in the jet engine field in increased efficiency and thrust output per pound of engine weight. The statistic for measuring this characteristic is "specific weight," the ratio of engine weight divided by engine thrust. Using this ratio, Fig. 1 illustrates the progress made in reducing the specific weight of General Electric engines over the past decade and a half. This achievement has been accompanied by increased thrust, lower fuel consumption and considerably longer life and reliability. Security regulations prohibit the presentation of data on engines later than the J73. A British forecast, however, indicates the nature of future engine specific weights.

The giant step in achieving this remarkable specific weight reduction results from the efforts of many people. The thermodynamic engineer has increased the efficiency of thermodynamic cycles to extract greater output from the same size package. The mechanical design engineer, materials engineer, and the stress analyst have developed more efficient structures following the principles of the "One Hoss Shay." They have eliminated unbalance, over design and duplicate parts by making other parts serve two or more functions. The manufacturing groups have contributed improved methods and skills in light structure fabrication and excess metal removal.

What then is the contribution of the weight engineer, and what is the objective approach to weight control? During the development of a new engine, all members of the development team agree that the goal is high performance and light weight. As each member of the team concentrates on his highly specialized activity, however, he may lose the perspective of his actions on the long range weight results. The weight engineer, therefore, must assume the responsibility of navigator. During the four to five-year development cycle he must measure, analyze, integrate and provide current weight status and trend forecast in relation to the ultimate guarantee weight. He uses the objective approach to weight control, a method of establishing milestones for measuring progress, forecasting trends, and providing a basis for corrective action by the design engineer.

Overall, improved specific weight is dependent on closely coordinated teamwork between the thermodynamic engineer, the design engineer, the manufacturing groups and the weight engineer. One additional element is required, namely a management climate which will stimulate and recognize light weight design effort. This management climate provides a catalyst to the entire weight reduction effort.

to Jet Engine Weight Control

By J. F. Brown and R. J. Jensen
Jet Engine Dept. General Electric Co.
AIRCRAFT GAS TURBINE DIVISION

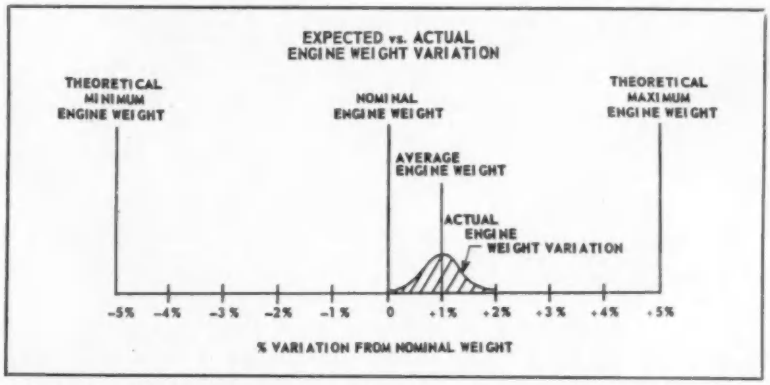

Fig. 3—Probability variation of actual engine weight resulting from the random effect of machining, casting, forging and sheet metal tolerances.

CLIMATE

Inherently the design engineer strives for "cast iron reliability to reduce the probability of failure to an insignificant minimum. Light weight design, on the other hand, must involve an element of calculated risk in early development testing. Management must indicate to the designer that it recognizes such a risk and is willing to accept early development failures and possible schedule setbacks. It is important to note that this calculated risk is associated with early development testing and does not compromise end-product reliability.

A lightweight design philosophy must be adopted with the initial design stages. If original parts are designed heavy with the intent of removing the weight later, the effort usually fails due to the feeling that, "if the part works, leave it alone" and because of manufacturing considerations such as tooling and inventory. This initial light weight design philosophy must be made known to, and adopted by, management during engine development.

Weight control measures, judges, and reports whether the integrated efforts of design and development will culminate in a fully developed product which meets market required weight. For this reason, it is essential that weight control be a distinct and equal partner on the management-design team.

THE OBJECTIVE APPROACH

The first step in the objective approach to weight control is to establish a weight guarantee for the production engine. This guarantee weight is established by weight control, starting with market trend and forecast provided by marketing, product planning and engineering advice on "state of the art" advances. The market trend forecast is calculated by complex methods of extrapolating past history, scaling, proportioning, and preliminary layout evaluation. Using these methods weight control submits a Weight Guarantee Proposal for management approval. The production engine must be competitive four to five years after its design concept.

Based on requirements for a competitive engine, advanced design begins study on an engine configuration which will meet these requirements. Since light weight is one of the major requirements, weight control must establish a target or *objective weight* to govern the initial design. This objective weight must allow for the normal growth in weight that will occur over the development cycle.

Contrary to Emerson, who said, "We aim above the mark to hit the mark," the weight engineer must aim below the guarantee to meet the guarantee. In order to determine how far below the guarantee weight this objective weight should be, an examination of jet engine weight history was conducted. This examination indicated the objective weight should be approximately 18 per cent below the guarantee weight. The 18 per cent consisted of four major items, as follows:

1. *Weight tolerance stackup.* Past experience revealed that the weight of the engine on the production line could be expected to have a random weight variation of approximately one per cent from the average weight. This variation is due to the dimensional tolerances on all engine parts. Since the guarantee weight is a maximum weight, this one per cent must be considered in establishing the objective weight.

2. *Flight Margin.* In any engine design, there will be certain "bugs" which are not discovered in the test cell, but are corrected during flight tests. Since the majority of the corrections involve weight increases, a two per cent margin has been set aside for these changes.

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MOTOCYLINDERS

A New Tool for Machine Designers

By P. A. Rabideau

Consulting and Application Engineer

WESTINGHOUSE ELECTRIC CORP.

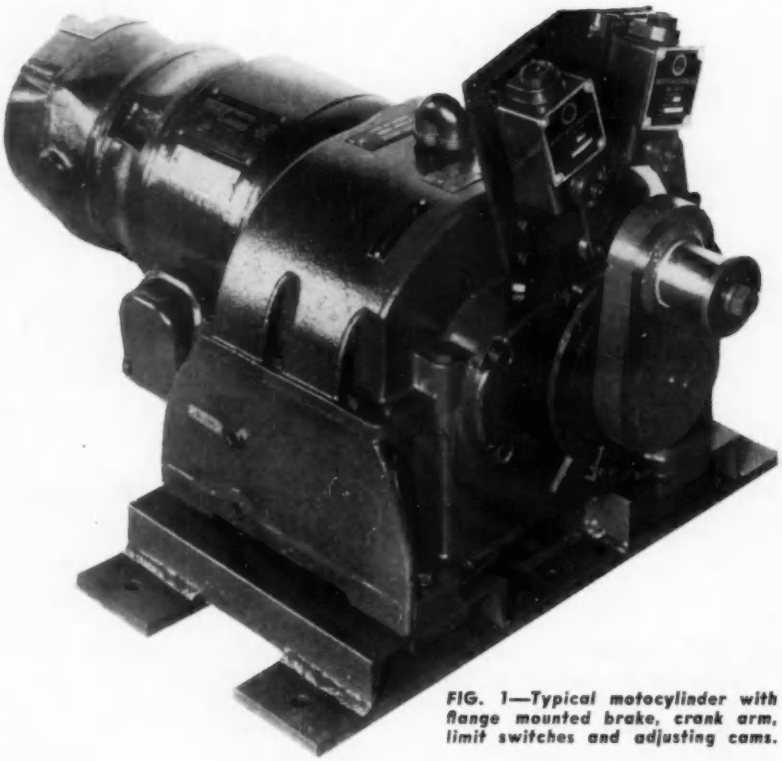


FIG. 1—Typical motocylinder with flange mounted brake, crank arm, limit switches and adjusting cams.

A MOTOCYLINDER can be used on most machines where reciprocating motion is required. Suitably applied, it can perform functions in the automotive industries that are now being done by pneumatic and hydraulic cylinders. They can be used on shuttle transfer mechanisms, welding presses, and numerous transfer and indexing devices.

A motocylinder, sometimes referred to as an autocylinder, is a simple electromechanical device consisting of an electric motor adapted to the housing of a gear unit. A crank arm is connected to the slow speed output shaft of the gear unit and this crank arm is used to impart reciprocating motion to a machine member. Limit switches are operated by cams mounted on the crank assembly and provide the necessary intelligence for stopping and starting the motocylinder at a desired position. If mechanical braking is desired, a disk type brake is flange mounted to the motor. Figure 1 shows a motocylinder with a flange mounted mechanical brake.

Unlike a flywheel and clutch press operation, the motor is started and stopped every cycle. Some advantages of a motocylinder are:

1. Only electric power is required for complete operation of the drive.

2. Cycle times up to 1200 operations per hour are realistic.

3. The inherent advantages of simple harmonic motion are available with the resulting sine wave velocity curve of the load.

4. This type of system has low maintenance because of the simple electromechanical scheme and uncomplicated control required.

5. The motor returns electrical power into the power system during a portion of the cycle period.

6. Both electric and mechanical braking are available.

7. It can be interlocked with existing control schemes.

As shown by Figures 2 and 3 there are two basic motocylinder motions; loads moved in a vertical plane and loads moved in a horizontal plane. Any configuration other than these basic motions would be a combination of the two motions. In any case, the load velocity follows a modified sine function as shown in Figure 4. The load acceleration follows a modified cosine function as shown in the same figure. Note that the load accelerating periods are always from zero to 90 deg and 180 to 270 deg, and the load decelerating periods 90 to 180 deg and 270 to 360 deg crank rotation.

A feature of this drive that may be noted is the fact that during deceleration the load is actually trying to overhaul (make run faster than synchronous speed) the motor and power is returned back into the power system, resulting in a net power saving.

With horizontal movement,

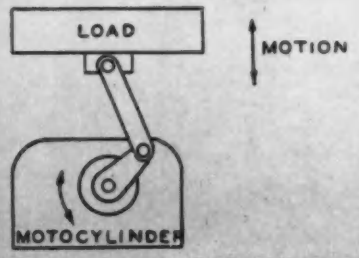


FIG. 2—Basic operation of a motocylinder in the vertical plane.

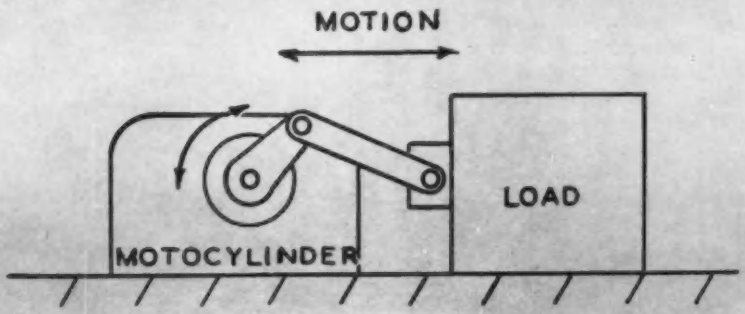


FIG. 3—Basic operation of a motocylinder in the horizontal plane.

power is returned to the power system during the decelerating periods providing the friction load is small, because of the counter torque required from the motocylinder.

With vertical motion, the initial decelerating counter torque is aided by the gravitational force of the load and little, if any, power is returned into the system when the load is raised. However, when the load is being lowered (180 deg to 360 deg) the drive must exert counter torque continually and power is returned to the power system during the complete lowering period.

Because of the above fact the actual slowing down of the load is performed by the overhauling of the motor and the braking, whether mechanical or dynamic, need not be applied until the last few degrees of crank rotation. With the majority of the braking being done by the motor, the size of the braking system, mechanical or electrical, can be kept to a minimum.

The standard drive for the motocylinder is a NEMA Design D induction motor, totally enclosed, non-ventilated, 18 to 13 per cent slip, 60 cycle, 1200 rpm, with a minimum pull-out torque of 275 per cent. For comparison, speed torque curves of the conventional NEMA Design B and NEMA Design motors are shown in Fig. 5.

The high torque capabilities of NEMA Design D motor provide rapid acceleration of the motor rotor. Because of the crank motion,

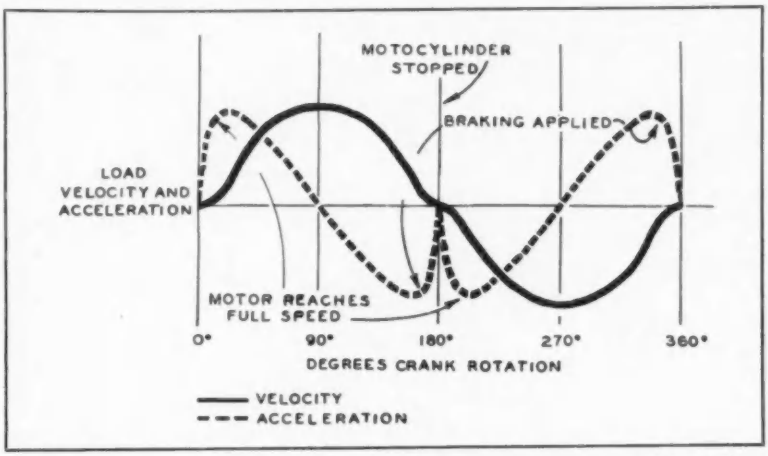


FIG. 4—Load velocity and acceleration curves with the motocylinder being stopped at the 180 deg position.

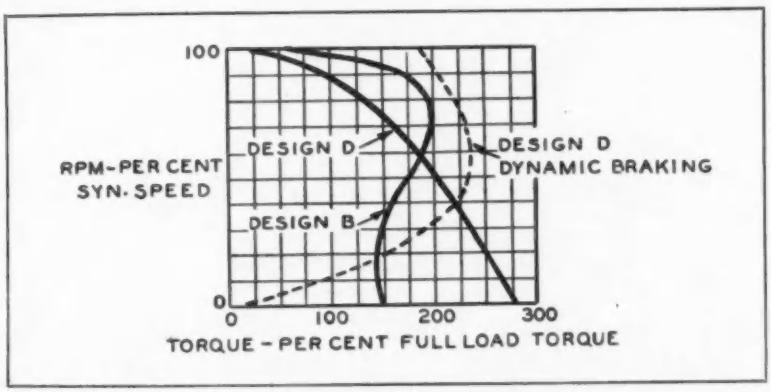


FIG. 5—Speed-torque curves for NEMA designs B and D motors. Typical braking curve for design D motor is shown.

the inertia of the motor rotor and the inertia of the load are not accelerated at the same time. Very little load inertia is reflected to the motor during acceleration and the motor is up to speed in a few degrees rotation of the crank arm. By this method the accelerating

and decelerating losses of the motor are kept to a minimum. With the high torque available it is possible to jog the drive through the 90 deg portion of the load cycle where maximum loading of the motor exists.

Another feature of the NEMA Design D motor is its inherent capability of starting and stopping more times a minute than the NEMA Design B motor. This gives the Design D motor a decided advantage in applications where the maximum number of cycles per minute is critical.

Two types of braking are available for use with the motocylinder. The conventional disk-type friction brake, which is flange mounted to the motor, or dynamic braking.

In cases where there is an overhanging load when the drive is stopped, the mechanical brake should be used to hold the system from creeping. Of course, the disadvantage of this method is the maintenance required by the brake and the addition of the brake drum inertia to the system with the consequential reduction in available cycles per hour.

If the mechanical brake is applied, only a conventional motor starter interlocked with the motocylinder limit switches is required.

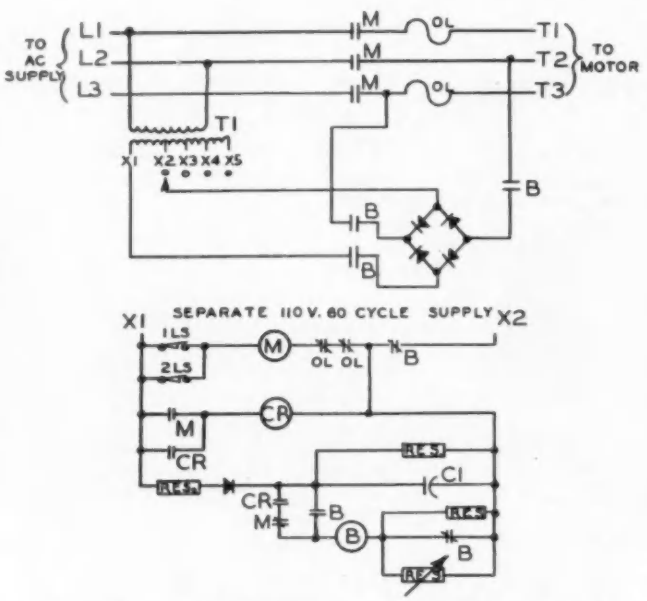


FIG. 6—Typical schematic diagram for dynamic braking control.

Dynamic braking is the removal of a-c voltage from the motor and the application of direct current to two motor windings. With the direct current applied the motor acts as a generator and is loaded by the induced current flowing through its squirrel-cage rotor winding. The amount of braking is determined by the magnitude of direct current applied to windings. Figure 5 shows a speed-torque braking curve for a NEMA Design D motor.

If dynamic braking is desired, a packaged type control called Dynac is available. It contains the motor starter, disconnect (if desired), d-c rectifiers, braking and control relays and a timing circuit.

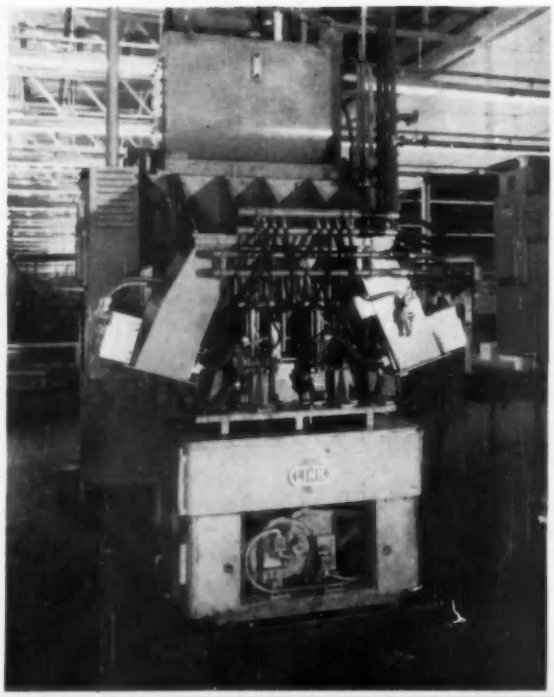
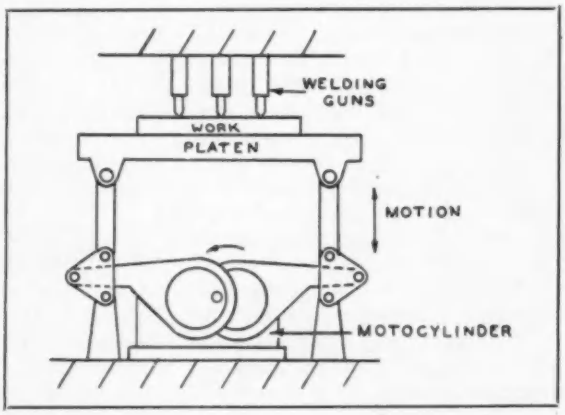


FIG. 7—At left is a motocylinder operated press welder shown in the "up" position. Motocylinder is five horsepower and utilizes dynamic braking.

FIG. 8 — Below is a simplified press welder diagram. Vertical reciprocating motion is imparted by motocylinder — mounted cams and a mechanical knee system.



A typical schematic of this braking control is shown in Fig. 6. The amount of braking applied is determined by the top setting on the transformer T1 and the length of time the d-c current applied by the setting of the timing potentiometer.

An excellent example of a vertical motion motocylinder application now in service is shown in the photograph in Fig. 7. This machine is a press welder for welding a multiplicity of automotive parts. A simplified diagram of this machine in the "up" position is shown in Fig. 8.

Operation of the press welder is similar to a conventional press except the press is stopped in the "up" position. The part to be welded is placed in the fixture on the platen while the machine is in the "down" position. The operator initiates the cycle by pushbuttons, the motocylinder crank arm rotates 180 deg and the drive is dynamically braked to a stop. The welding guns are brought out automatically and the part welded. Once the weld is made, the weld timer signals the motocylinder control and the platen is returned to the "down" position where the welded part is removed. This type of press welder is capable of operating 1200 cycles per hour.

In this drive the reciprocating motion is imparted to the platen by two eccentric cams, which serve as crank arms, connected to the low speed output shaft of the motocylinder. These cams raise and lower the platen.

FIG. 9—A three horsepower motocylinder drives this transfer table on a clutch-cover press line.

Dynamic braking is used to good advantage in this application. The press welder is so designed that while the press welder is in the "weld" position the mechanical linkage has an "over-center" feature. This feature prevents, without the use of holding brake, the downward force of the welding guns from rotating the drive. Also, this type of linkage does not require accurate stopping requirements.

An application of a motocylinder operating in a horizontal plane is shown in the photograph in Fig. 9. The function of this transfer machine is to transfer clutch covers between press operations. Figure 10, next page, is a simple diagram of this operation.

The motocylinder drives the transfer mechanism through a rack and pinion system which produces the horizontal movement of the machine. On the forward stroke the clutch cover is transferred into the entry side of a press. After the stamping or drawing operation and the return stroke is completed, the clutch cover is removed from the opposite side of the press and transferred to the next press on the following forward stroke.

A conventional disk-type brake was used on this motocylinder because the system required holding torque at zero speed.

Let's look at the requirements of a given transfer machine and see what size motocylinder is required for the system. Figure 11 shows an example of a shuttle-type transfer machine used for transferring engine blocks in a broaching operation. The total weight to be indexed is 10,000 lb, which would produce a horizontal friction force of approximately 2000 lb. The cycle is as follows: the loaded forward stroke transfers the load in two seconds; the drive remains at rest for one and one-half seconds while the dogs are retracted; the unloaded return stroke is made in two seconds; and the final dwell time is three and one-half seconds while the machining operation is performed. The complete cycle time is nine seconds which provides 400 operations per hour, and

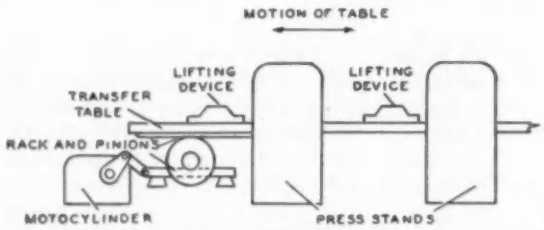


FIG. 10—Diagrammatic sketch of clutch cover press line showing motocylinder operating through a rack and pinion system.

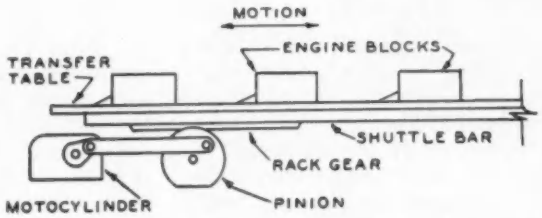


FIG. 11—Example of a typical shuttle-type transfer machine. Here the transfer mechanism pushes engine blocks between broaching operations.

the rating of the motocylinder to accomplish this is seven and one-half horsepower. Dynamic braking would be applied in this application because of the absence of load at zero speed.

Summary

The motocylinder makes possible new and effective methods for powering high duty cycle machines in the automotive industries. In most applications requiring reciprocating or oscillating forms of motion the motocylinder is a versatile drive that can be easily applied. It is simple in operation, has low maintenance, requires only one source of power and provides the advantages of simple harmonic motion. Cycle times up to 1200 operations per hour are realistic with a minimum consumption of power and with a low investment cost.

• • •

Nickel Sulfamate Bath for Stress-Free Plating

(*Continued from page* 65)

The substitution of one of the hydroxyl (OH) groups of sulfuric acid for the amido (NH_2) group gives to sulfamic acid many of its unique properties which reflect in the superior qualities of electrodeposits obtained from its metal salts in aqueous solution. Sulfamic acid is moderately soluble in water. It produces solutions which are highly acid and compares in pH range with those of the three common mineral acids: nitric, sulfuric and hydrochloric.

The metal salts of sulfamic acid are extremely soluble, and in many instances are the most soluble metal salts known to science. Sulfamic acid is monobasic and will react with metals, oxides or carbonates to yield the corresponding metal sulfamate by replacement of one hydrogen atom associated with the hydroxyl group.

A convenient method of preparing nickel sulfamate can be obtained by the reaction of a solution of sulfamic acid with nickel carbonate, as seen by the following equation:

$$Ni\,CO_3 + 2NH_2SO_3H \longrightarrow Ni\,(H_2NSO_3)2 + H_2O + CO_2$$

The nickel sulfamate bath presently being utilized at Ryan is controlled to the following composition and specifications:

Nickel Sulfamate	60 oz./gal.
Nickel Metal Equivalent	12.2 oz./gal.
Boric Acid	4 oz./gal.
Anti-pit Agent (Wetting Agent)	0.05 oz./gal.
pH of Bath	3.0-4.5
Temperature	100°-140°F
Density	29-31° Bé (Baumé)
Agitation	Cathode bar movement, solution circulation or both
Anode efficiency	100%
Cathode efficiency	98-100%

It is extremely important to accurately measure and precisely control the pH of the bath. As the pH increases, the compressive stress in the deposit and hardness increases as does the throwing power. Sulfamic acid is used to lower the pH, while nickel carbonate raises the pH. In addition, the bath temperature must be held to close limits in order to consistently obtain the desired properties of the deposited metal. The hardness of the deposit decreases with increase in temperature within the temperature limits of the bath.

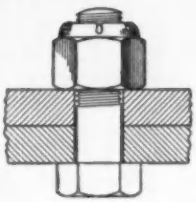
By means of precise physical, chemical and electrochemical controls of the processing, the following properties and characteristics are obtained:

1. Stress-free deposits
2. Nickel deposits of high chemical purity
3. Improvement to fatigue strength of underlying base metal
4. Excellent grain structure and ductility
5. High level action for easy buffing
6. High tensile strength
7. Excellent corrosion resistance
8. Hard deposits with good ductility
9. Heavier, harder, more ductile deposits without build-up of trees and nodules
10. Ductile deposits with controllable compressive and tensile strength

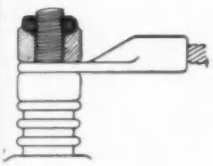
From an inspection of the physicomechanical properties of the nickel as deposited in Ryan's modern laboratories, the aeronautical engineer has at his disposal a powerful, versatile tool to assist him in his design and production problems.

Ten fastening problems solved by ELASTIC STOP® nuts

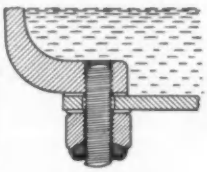
TIGHTENED AGAINST THE WORK



Vibration and impact proof bolted connections in standard applications.

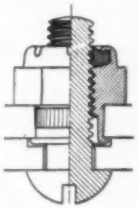


On all electrical terminals subjected to vibration in transit or operation, and for any electrical or electronic assembly where positive contact must be maintained.

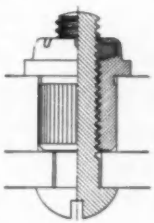


To seal bolt threads where leakage past stud threads must be prevented.

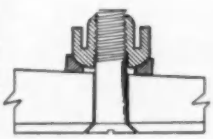
FOR MANY SPECIAL FUNCTIONS



Blind fastening applications where nut is "clinched" into sheet metal . . . becoming self-retaining as well as self-locking.

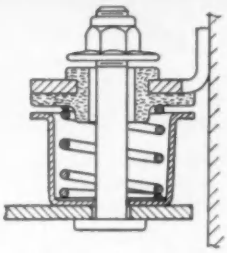


To eliminate drilling and tapping and provide steel thread strength for soft metals, an ESNA spline nut is pressed into a bored hole in casting.

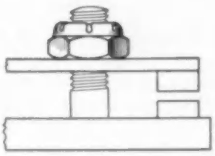


Simplified self-aligning self-locking fastener for bolting two non-parallel surfaces.

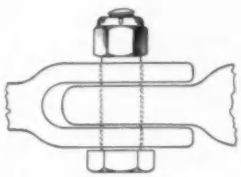
LOCKED ANYWHERE ON THE BOLT



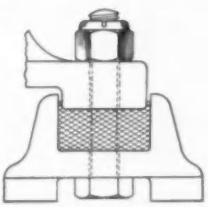
Spring-mounted connections or dynamic balancing, where nut must stay put yet be easily adjusted. (Flanged face eliminates need for extra washers.)



On make and break adjustment studs where accurate contact gaps must be maintained. Note "thin" height design for limited clearance.



For bolted connections requiring predetermined play.



For rubber-insulated and cushion mountings where the nut must not work up or down.

HOW THESE NUTS SOLVE SO MANY FASTENING PROBLEMS, ELIMINATING EXTRA PARTS AND OPERATIONS...

The red locking collar of an ELASTIC STOP® nut grips bolt threads with a perfect fit that will not loosen under severe vibration or stress reversals, and seals against liquid seepage. By bringing nut and bolt metal thread flanks into firm contact it eliminates wear producing axial play. The elastic locking action of the insert-type stop nut does not distort or gall bolt threads. It is reusable many times.

Send for the following free information: Elastic Stop nut bulletin; Rollpin® bulletin. Or enclose a drawing of your product for specific self-locking fastener recommendations. Write to Dept. N30-75.

ESNA

ELASTIC STOP NUT CORPORATION OF AMERICA
2330 VAUXHALL ROAD, UNION, NEW JERSEY

over 14,000 8,000 Different Cylinder SELECTIONS—

Miller AIR AND HYDRAULIC

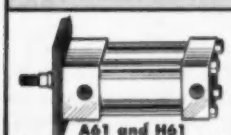
"STANDARDIZED" CYLINDERS

"IN STOCK" for immediate delivery...

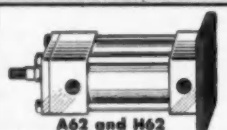
See Miller Bulletins A-105 (Air) and H-104 (Hydraulic) for Complete Dimensions and Engineering Data on these standardized "in stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 ft.

"IN-STOCK" MODELS

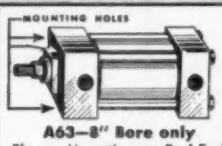
"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.



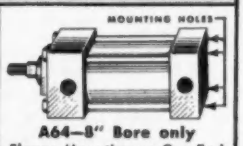
A61 and H61
Flange Mounting on Rod End
(A61 not available in 8" bore)



A62 and H62
Flange Mounting on Cap End
(A62 not available in 8" bore)

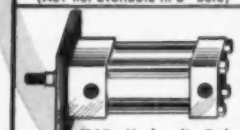


A63—8" Bore only
Flange Mounting on Rod End

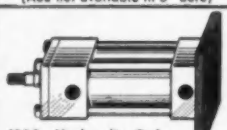


A64—8" Bore only
Flange Mounting on Cap End

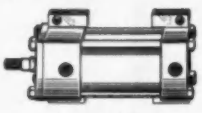
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



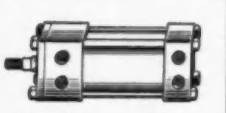
H65—Hydraulic Only
Flange Mounting on Rod End



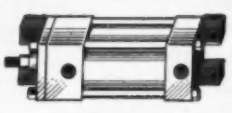
H66—Hydraulic Only
Flange Mounting on Cap End



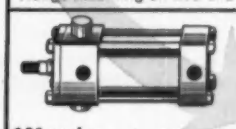
A72 and H72
Side Lug Mounting



A74 and H74
Side Flush Mounting

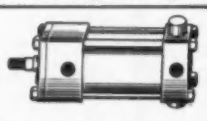


A77 and H77
Side or Foot Mounting

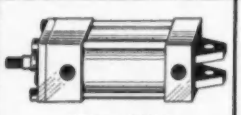


A81 and H81 Trunnion Mounting on Rod End

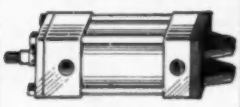
Your Choice of
CAP END CUSHIONED
ROD END CUSHIONED
or
BOTH ENDS CUSHIONED
on all cushioned strokes of all bores shown.



A82 and H82 Trunnion Mounting on Cap End



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN STOCK BORES in Inches

"IN-STOCK" STROKES (in Inches)

	BORES	ROD DIA.	ROD TURN DOWN & THREADS		1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
AIR	1½	⅝"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12									
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12									
	2	⅝"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	2½	⅝"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	3¼	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	4	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	5	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	6	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	8	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
HYDRAULIC	1½	⅝"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12									
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12									
	2	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	2½	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	3¼	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	4	1¾"	1¼-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
	5	2"	1½-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

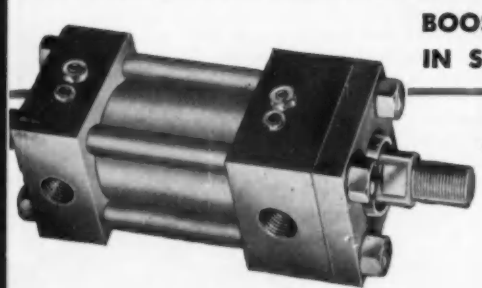
Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.



BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBA8, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

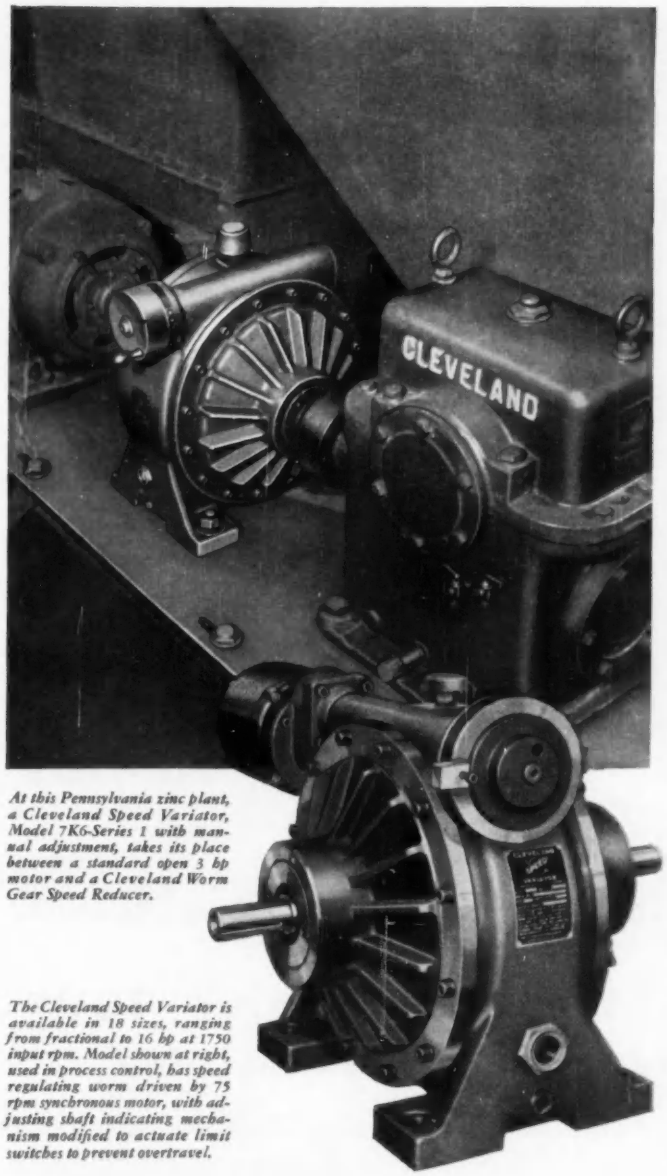
Write For Catalog and Stock Price List

Miller

Miller FLUID POWER DIVISION
Flick-Reedy Corp

2028 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS



At this Pennsylvania zinc plant, a Cleveland Speed Variator, Model 7K6-Series 1 with manual adjustment, takes its place between a standard open 3 hp motor and a Cleveland Worm Gear Speed Reducer.

The Cleveland Speed Variator is available in 18 sizes, ranging from fractional to 16 hp at 1750 input rpm. Model shown at right, used in process control, has speed regulating worm driven by 75 rpm synchronous motor, with adjusting shaft indicating mechanism modified to actuate limit switches to prevent overtravel.

CLEVELAND SPEED VARIATOR

adjusts rate of feed of zinc concentrate to hammermill's capacity

DRY, partially roasted, zinc from a new roaster at one of the most important zinc smelters of Western Pennsylvania is fed from the bin to the hammermill by a 12″ screw. Delivery to the hammermill must be varied over a wide range as the demand indicates. The easiest way to vary the feed was, of course, to drive the screw at variable speeds —and the Cleveland Speed Variator was selected for the job.

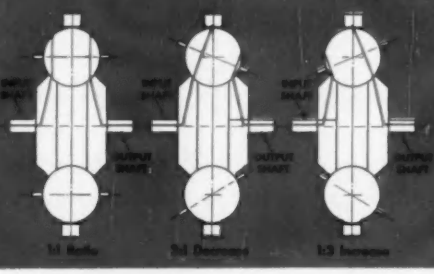
Being infinitely variable, the Cleveland Speed Variator gives stepless speed over a full 9:1 range —from ⅓ to 3 times input speed. Output speed on this application is adjusted by the hand wheel on the Variator—but could be regulated by either manual or automatic remote control.

The Cleveland Speed Variator offers these major advantages:

1. An extremely compact unit with input and output shafts in line and rotating in the same direction.
2. Almost any input speed up to 1800 RPM can be used—either clockwise or counterclockwise rotation.
3. Rated for constant horsepower output over a 9:1 or 6:1 range; or for constant output torque over a 6:1 range.
4. Speeds infinitely variable over entire range of adjustment.
5. No slippage—positive torque response mechanism adjusts in direct proportion to the loads encountered.
6. Long life and minimum maintenance due to absence of belts or complicated linkages.
7. Ample bearing support for overhung pulleys on either input or output shafts.

Write for Bulletin K-200 for detailed description with photographs, sectional drawings, rating tables and specifications.

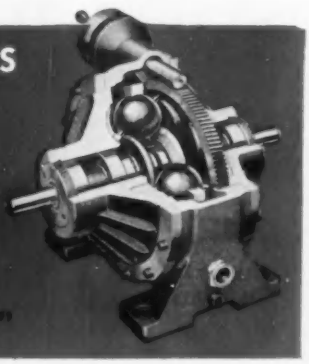
HOW THE CLEVELAND SPEED VARIATOR WORKS



Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts.

Relative speeds of the shafts are adjusted by changing the positioning of axles on which the balls rotate (diagram, right, shows cutaway Variator with hand regulating wheel).

"It's the Drive That's on the Ball."

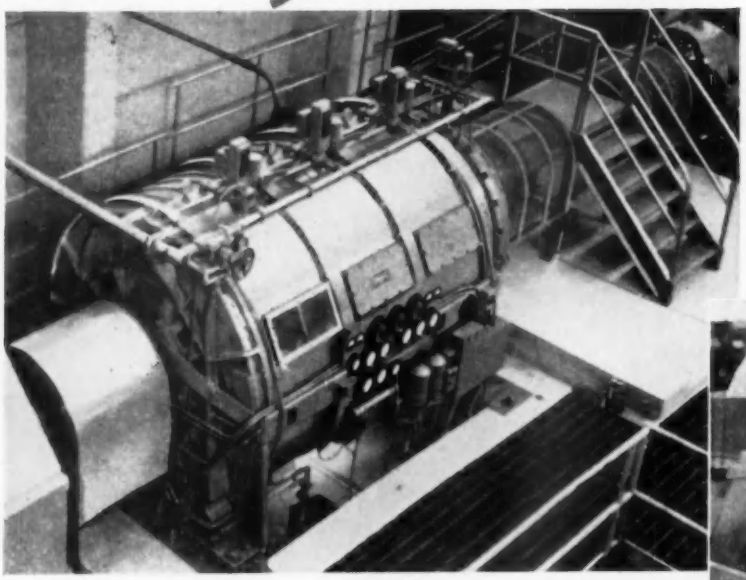


THE CLEVELAND WORM AND GEAR COMPANY

Speed Variator Division, 3274 East 80th Street, Cleveland 4, Ohio

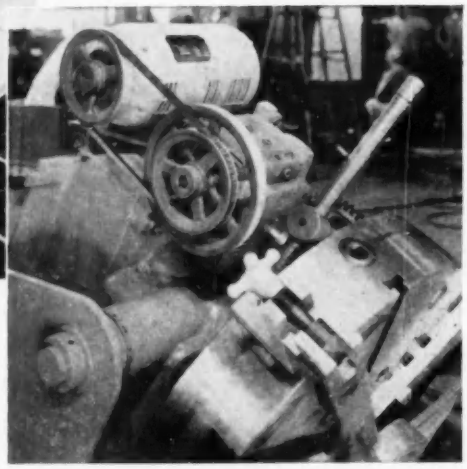
Sales Representatives in all major industrial markets • In Canada—Peacock Brothers Limited

20,000 H.P.



OR

¼ HORSEPOWER



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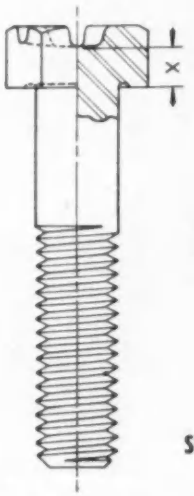
...cut costs...add strength

. . . wherever involuntary loosening or fatigue is a problem!

In some typical automotive and farm equipment applications, for instance, "Place" Bolts are being used as connecting rod bolts, main bearing cap screws, and flywheel bolts.

Here, and wherever a locking bolt may be needed, the Slotted-Type "Place" Bolt offers not only positive locking action but economy and additional strength. It cuts costs because no additional parts or operations are needed. It adds strength because its controlled spring action guards against impact, shock and fatigue failures.

National makes the Slotted-Type "Place" Bolt in carbon or alloy steel, in any of a wide range of sizes. Write us for additional information, including our illustrated folder.



HERE'S HOW SLOTTED-TYPE HEAD LOCKS

The flexible diaphragm formed between slotted segments in the upper face of bolt head and circular recess adjacent to the shank in lower face (section X) acts as controlled spring element when head is properly wrenched against a rigid seat. Diaphragm is reinforced by the continuous-grained segment cold formed between upset slots in upper face.

U. S. Patent No. 2543705

THE NATIONAL SCREW & MFG. COMPANY

Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 23, Cal.

National PRODUCTS

Fasteners  Hodell Chains  Chester Hoists 

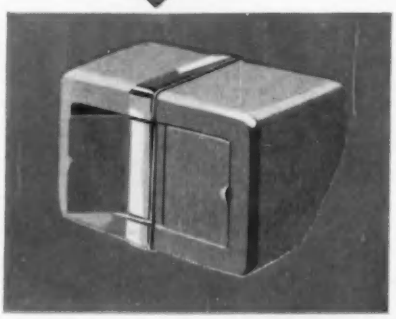
. . . as EVANS HEATERS are right for trucks!

The cowboy's gear is picturesque yet practical. From sombrero to spurs it's designed to help him do a special job. Evans Heaters are designed and engineered to do a special job, too—a truck-heating job—and Evans Heaters are right for trucks because they're built for trucks!

An Evans Truck Heater provides maximum comfort by flooding the cab with a constant stream of well-heated fresh air which keeps the driver warm and alert, the windshield free from ice and snow. The safety factor increases, so you actually get additional "cargo insurance."

The best materials and the best manufacturing methods are combined to produce these rugged Evans units that deliver high-volume heat with a minimum of maintenance. Every unit is backed by a "repair or replace" parts warranty good for a full year or 50,000 miles.

If you have a stubborn heating problem, Evans engineering advice is yours without cost. For this free service, or a complete catalog of Evans Heaters, write Heating and Ventilating Division, Evans Products Company, Department P-7, Plymouth, Michigan.



EVANS HEATERS ARE RIGHT FOR TRUCKS BECAUSE THEY'RE BUILT FOR TRUCKS

REGIONAL REPRESENTATIVES: Cleveland, Frank A. Chase Chicago, R. A. Lennox Co., Inc. • Detroit, Chas. F. Murray Sales Co. • Allentown, Pa., P. R. Weidner

EVANS PRODUCTS COMPANY also produces:

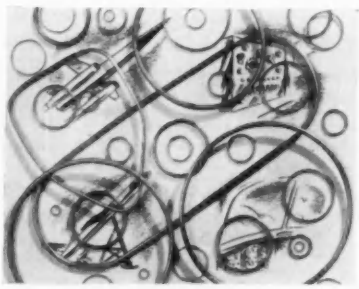
railroad loading equipment; bicycles and velocipedes; Evaneer fir plywood; fir lumber; Evanite hardboard and Evanite battery separators.

NEW PRODUCTS
AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Metal O-Rings

Pressure-filled metal O-rings, designed to provide increased resilience and improve sealing characteristics at elevated temperatures, are in a line recently announced. The standard 0.010-in. stainless steel O-rings are



filled with gas at various pressures ranging from 500 to 3000 psi at room temperature. This internal gas pressure is said to offset loss of the metal's strength at elevated temperatures.

Missiles, rockets, aircraft gas turbines and other applications where operating temperatures exceed 1000 F, depending upon variables of pressure and sealed material, are stated to be principal uses of these new O-rings. Other applications include those where flange faces during the temperature cycle separate to a distance greater than the recovery of a standard ring.

The O-rings are made with variations in pressure filling and materials to meet specific requirements. *The Advanced Products Co.*

Circle 60 on postcard for more data

Fibrous Sheeting

Highly porous fibrous sheet made of Teflon resin offers interesting prospects in filtration processes, according to a company where this new class of materials is currently under development. Called Armalon, the material combines properties suggesting use as filter media where other paper-like structures are not satisfactory. It withstood seven days' exposure at 550 F. Chemical resistance has been tested by seven days' immersion in concentrated sulfuric, hydrochloric, nitric acids, etc. Applications might include filtration of strong acids and bases, virtually all solvents, liquid fuels, lubricants, and hydraulic fluids over a wide temperature range.

Laboratory data indicate that Armalon fibrous sheets are effective in removing very fine particles from liquid suspensions. Another potential application is the removal of suspended particles from hot corrosive gases. Not readily wettable by water, the sheets may also be useful for separating water droplets from organic liquids such as gasoline. They are serviceable at temperatures from −100 F to +400 F (or higher under certain conditions). *E. I. du Pont de Nemours & Co.*

Circle 61 on postcard for more data

Miniature D-C Motors

Round miniature motors, utilizing parts molded of Plaskon Nylon to achieve good insulation, self-lubrication and durability, are in a new series just introduced. Designated Series 500, they use Nylon-molded commutator hubs, lead insulators, motor brush supports and governor base.

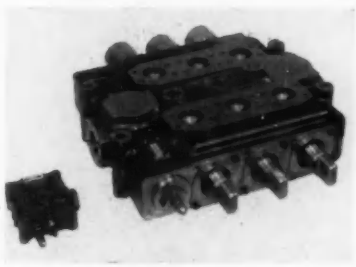
The company produces six series (100 to 600) of small d-c motors with torque ranges from 0.3 to 3½ oz.-in.

and speeds varying from 1800 to 18,000 rpm, for 3 to 24-v usage. The 500 and 600 series are available with governors for constant-speed applications. *Rowe Industries, Inc.*

Circle 62 on postcard for more data

Fluid Control Valve

Introduction has been made of a Hydreco directional control valve for fluid power circuits that has a capacity of 150 gpm at 2000 psi. Its three plungers will control single or double-acting cylinders required for opera-



tion of heavy-duty earth-moving and other mobile equipment such as large-capacity materials handling units. The unit incorporates a hollow-plunger design which provides a check valve built into the control plunger to prevent back-flow from the cylinders when operating positions are being changed. There is also a built-in relief valve to protect the system from overload.

The illustration shows comparison in size with a valve of 5 gpm capacity of similar type. *Kalamazoo Div., The New York Air Brake Co.*

Circle 63 on postcard for more data

Industrial Greases

Formulated with a new organic thickener, a line of industrial greases has been introduced for use especially in applications where extreme heat or excessive moisture may be present. The non-soap thickener is the result of a five-year program at the company's research laboratories. Four regular greases and three EP grades are available under the name Rykon. They are classed as multi-purpose.

The new thickener makes the greases more stable than any previously used gelling agent, according to the company. They have an ASTM dropping point of 480 F, and are said to have exceptional chemical and

(*Turn to page* 80, *please*)

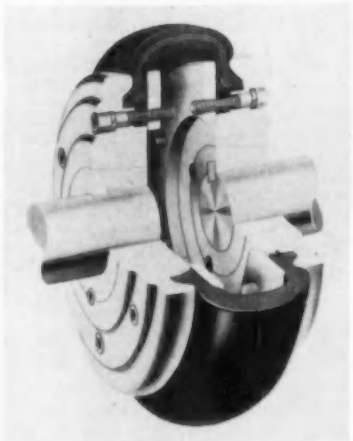
NEW PRODUCTS CONTINUED FROM PAGE 79

physical stability and to be resistant to water and oxidation. *Standard Oil Co. (Indiana).*

Circle 64 on postcard for more data

Flexible Coupling

Para-flex is the designation for a new industrial flexible coupling which utilizes a special rubber tire clamped between two hubs mounted on the coupled shafts. Ability to handle angular misalignment, parallel misalignment and end-float, in any combination, is one of the advantages claimed for the coupling. The flexible



member also cushions shock loads and absorbs torsional vibration.

The tire is composed of synthetic tension members bonded together in rubber. It has a molded-in transverse split, allowing ready installation and making possible replacement without moving either driving or driven machine. It is held between the flanges and clamp rings of the hubs using capscrews. Both hubs are machined to take Taper-Lock bushings which permit easy application to shafts of different diameters without reboring.

According to company engineers, the coupling will take angular misalignment up to four degrees, parallel misalignment up to ⅛ in., and end-float up to 5/16 in., contingent upon the size of the coupling and duration of the conditions. There is no metal-to-metal contact requiring lubrication. Safety is promoted by flush design. All capscrews are countersunk, metal surfaces are finished all over, and there are no protruding parts. The design is available from factory stock in units with capacities up to 600 hp at 900 rpm. *Dodge Manufacturing Corp.*

Circle 65 on postcard for more data

Air Brake Filter

The availability of a new air brake filter made of rayon acetate Windsor felt, which is said to be low-priced and to have lateral rigidity with resilient thickness, has been announced. It is a lint-free dust filter which reportedly has the advantages of low pressure drop and high solids capacity. *American Felt Co.*

Circle 66 on postcard for more data

Metal Preprimer

Corrosion protection for galvanized metal, aluminum or sandblasted steel surfaces is provided by a metal conditioner called Tropical Preprimer. It was developed by the Parker Rust Proof Co. as a substitute for Bonderite on objects too large for dipping. Applied by brush or spray, the one-coat conditioner dries to touch in 15 minutes. Ready for use as shipped, except for thinning, the material needs no accelerator. It is said to lengthen paint life by improving adhesion of the following primer and finish coats. *Tropical Paint Co.*

Circle 67 on postcard for more data

Shoulder Screws

Upset-forged shoulder screws, in diameters up to 2½ in. and of any desired length, are in a line recently developed. Upset-forging is said to provide an unbroken and uniform grain flow giving high-strength characteristics. Other stated advantages are close tolerances and material savings.

The screws, made in hexagon head and a wide variety of shoulder and other head shapes, are designed for many applications. They may be used as axles, mounting bolts, conveyor system links, in die sets and in other

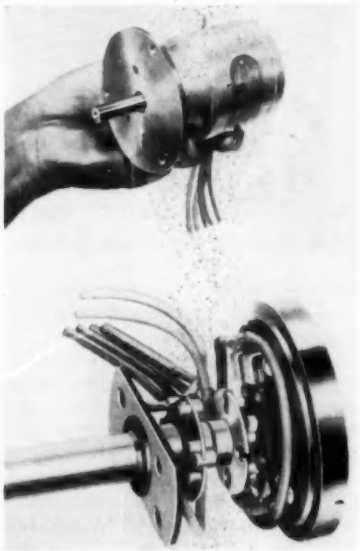
assemblies where a close-tolerance bearing surface and high shear strength are essential. *Cleveland Cap Screw Co.*

Circle 68 on postcard for more data

Speed Detector

Arranged for flange mounting, a newly-designed self-contained speed detecting device known as the Syncro-Pak has been announced. It uses a centrifugal switch as the sensing element, combinations of which can be incorporated to detect over-speed and under-speed in a narrow or wide range. Once detected, the speed can be controlled by any practical circuitry.

The device is said to be particularly adaptable for use on conveyor and



similar drives to indicate slippage or to actuate magnetic clutches. It can also provide a method of shifting multi-speed transmissions. On series wound motors it can be used for over-speed protection. When applied to Diesel generators, one to four units may be employed to control various operating phases, such as disengaging the starting mechanism when proper speed has been reached, protecting the electrical and mechanical equipment against over-speed, and other control needs.

The illustration shows a two-stage Syncro-Pak speed detector rated at five amperes. It incorporates two Syncro-Snap centrifugal switches, one of which limits over-speed and the other under-speed. *Torq Engineered Products, Inc.*

Circle 69 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT

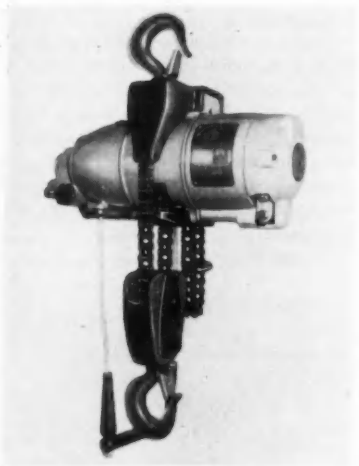
FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Air-Powered Hoist

ADDITION of a 4000-lb capacity hoist to a line of air-powered hoists has been revealed. Fitted with either roller or link chain, the lifting and lowering speed varies from a creep to 10 fpm at full load and 90 psig air line pressure. Length of lift is eight feet, and the hoist operates with either a one-hand control bar or remote pendant control.

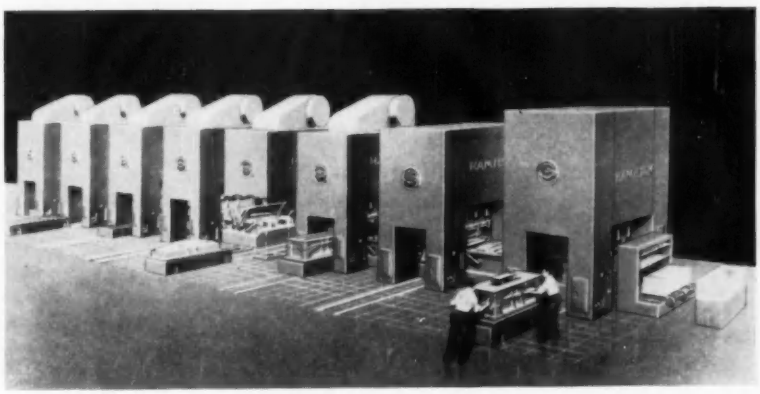
The axial-piston air motor is said to assure positive starts and stops, and to prevent motor burnouts during stalls. A centrifugally-governed, fully mechanical brake is provided to avoid slippage. If the air supply fails or maximum lowering speed is exceeded, the brake design permits the operator to retain control of the hoist while lowering the load.

The hoist weighs 100 lb, and is equipped with swivel-mounted safety suspension and load hooks. Hook-to-hook dimension is 23½ in. Accessories include trolleys for the hoist and air hose, a chain basket with 20-ft capacity, filter - regulator - lubricator, and non-sparking kit to adapt the hoist for operation in explosive atmospheres. *Keller Tool Div., Gardner-Denver Co.*



Keller Tool air-powered hoist of two-ton lifting capacity

Circle 30 on postcard for more data



Line of presses, shown in artist's conception, equipped with sliding bolsters to cut die change time and boost production. Suitable for high production on short runs, the design was developed by Hamilton Div. of B-L-H.

Press Design for Reducing Die Change Time

USING sliding bolsters and preset dies, a press design has been introduced which is said to give a drastic reduction in die change time. It can be applied as a single press or in groups, and is also applicable to all sizes and types of presses—single or double action; top or bottom drive; one, two or four point. Although the principle has previously been used by the company for die spotting presses, it is stated to be a radical advance for presses performing production operations such as blanking, drawing and forming. The new design was developed primarily for high production on short runs.

Production is increased because of the significant saving in die change time. As little as five minutes need elapse between the end of one production run and the start of another using a new die. When a press run is completed, the die is removed on the sliding bolster. A new die, set up on the second sliding bolster during operation with the previous die, slides into the press for another production run. Time savings also result in removing a die after the bolster is in the open, an overhead crane only being necessary in the way of lifting equipment.

Each press has two bolsters independently actuated by pushbuttons which control the motor drive in the press base. The bolsters can also be powered by motor-driven winches. Bolster movement can be independent or simultaneous, as required. Bolsters travel through the press sides rather than the fronts or backs — desirable for a line of presses. They can go through the front or back of a single press when required. *Hamilton Div., Baldwin-Lima-Hamilton Corp.*

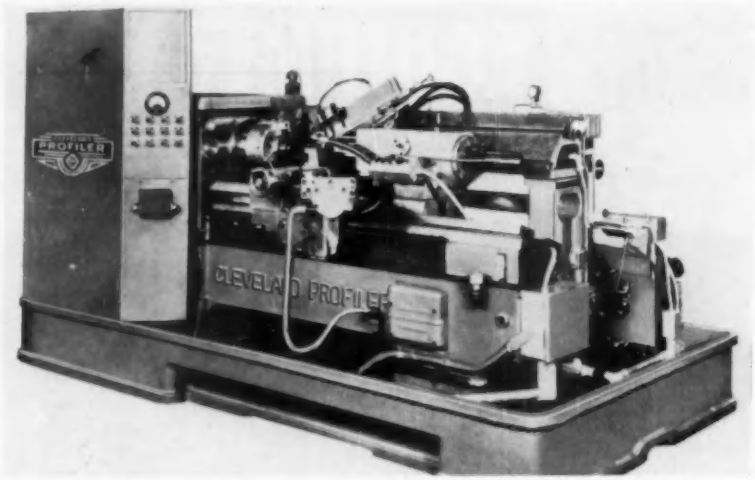
Circle 31 on postcard for more data

Front Wheel Analyzer

CALLED the Vide-O-Matic, a wheel alignment analyzer has been developed in which measurements are made by means of electronic multi-angle pickup arms that track all angular relationships of the two front wheels simultaneously. The readings are relayed through two Weston projection instruments to large TV-type screens in clear view of the operator. Visual indications of camber, caster, toe-in and steering geometry are provided. Continuous tracking of settings as adjustments are made guide the operator throughout the front end correction. Accuracy and time-saving are stated features of the device. *Kwik-Ezee, Inc.*

Circle 32 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT



Cleveland profile lathe, of heavy cast construction for rigidity, is designed to exploit advantages of carbide and ceramic tools

Profile Lathe for Use with Carbide and Ceramic Tools

HEAVY cast construction providing unusual rigidity is featured in the introduction of a new electrically-controlled hydraulically-actuated profile lathe. It is said to permit full utilization of the advantages of carbide and cermic tools, allowing spindle speeds to 5000 rpm and motors to 50 hp.

The profiler duplicates from flat or round templates or from a sample part. Quick sequence control settings are made on a panel of adjustable stops mounted on the front of the machine. Profiling is obtained by use of the company's balanced, spool, hydraulic tracing stylus that requires a force of less than 10 oz. The profiling slide is hydraulically-actuated and cycles automatically. It can take up to four automatic re-cycle passes at adjustable preset depths of cut. Two speed changes and two feed changes can be preselected for operations in any pass, combination of passes, or all passes.

Electric controls and panels are JIC standard, and are interlocked with the hydraulic system. Other features of the profiler are low spindle inertia with quick stop and start; infinitely variable feed ranges; large aircooled clutch-brake unit; and automatic lubrication of all parts.

The lathes are available with automatic or semi-automatic loading and unloading equipment and chip conveyors. They may be had with double saddles; multiple backslides; automatic size control; variable speed drive for constant cutting sfm; rocking or indexing toolholders; and thread rolling attachments. *Cleveland Hobbing Machine Co.*

Circle 34 on postcard for more data

New Gun-Type Drilling Machine Introduced

Recently developed to conform with growing demands in the gun type drilling field, the machine pictured features spindle speeds up to 8000 rpm with feeds from 0 to 40 ipm. It will take gun type drills up to one inch in diameter. The workpiece is held stationary. Feed is air-powered, oil-controlled, with either a six or nine-inch stroke. The base of the machine encloses a high-pressure coolant system delivering 7.6 gpm at 750 psi through the spindle of the unit. (Madison Industries Inc.)

Circle 33 on postcard for more data

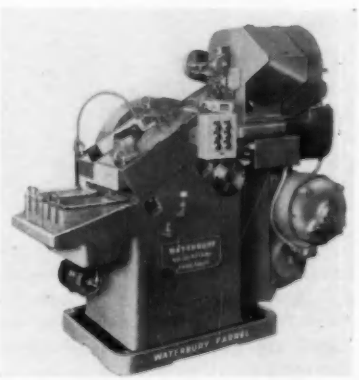
Rotary Die Threader

EMPLOYING a circular die and die segment, a threader recently introduced can thread various types of machine screws, as well as other headed parts. It will handle blanks from ¼ to 2-in. long and thread diameters from No. 6 to ¼-in. Production rates on blanks of conventional screw materials such as steel, brass and other alloys range from 200 to 600 per minute. Stainless steel blanks can be threaded at from 60 to 200 per minute.

A safety device in the flywheel protects the dies if an oversize, bent or deformed blank comes through the feeding chute. It consists of a shear pin that allows the flywheel to freewheel when the pin is sheared. A separately-driven rotor vane feed is used and a four-step pulley arrangement allows the operator to select the feeding speed.

The machine is normally equipped with a variable-speed motor drive to permit varying production speeds, but can be supplied with a single speed motor if desired. An attachment for knurling the head of the blank can also be provided as special equipment. *Waterbury Farrel Foundry & Machine Co.*

Circle 35 on postcard for more data



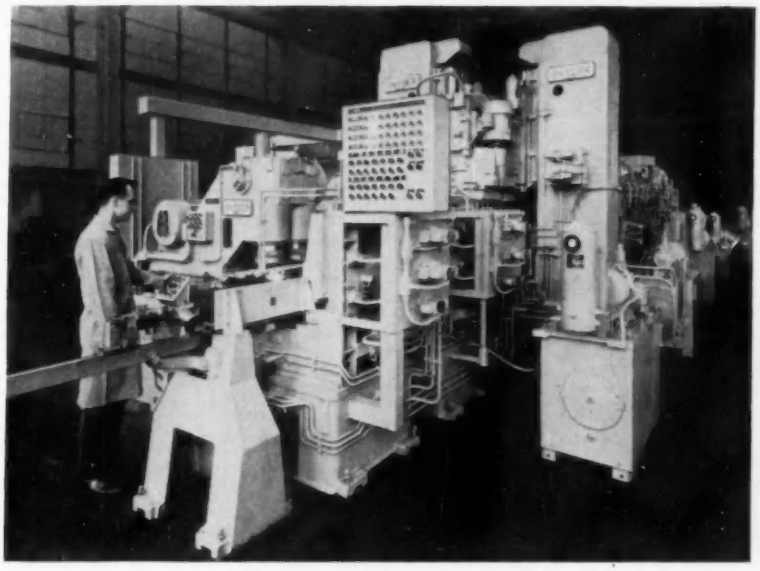
Waterbury No. 10 rotary threader

Segmented Transfer Machine Processes Two Different Parts

DEMONSTRATING the flexibility that can be built into segmented in-line transfer machines, a special unit has been designed for milling, drilling, chamfering and tapping two different automotive engine exhaust manifolds. Net production rate is 136 manifolds per hour. Built-in sensing devices in the 28-station, 63-ft long automated machine permit two different parts to be processed through the operations at random.

The joint faces of the two manifolds are identical and the milling, drilling and tapping operations are performed on these areas first. Additional clamping support is required for drilling, chamfering and tapping one of the manifolds. This is provided at these stations by sensing devices that find the part by detecting a cast surface and cause a hydraulically-operated clamp to engage the part.

The next operations on the manifolds are performed after the parts are automatically turned over by a rotating fixture. These subsequent milling, drilling, chamfering and tapping operations are not common to both parts. Part "A" is processed through these operations and passes through the balance of the machine with the stations automatically idled by sensing devices that detect one part from another by searching for the cast surface. Part "B" has idle stations through the first operations and is processed in the last stations.



Snyder transfer machine simultaneously handles two different manifolds

Probing stations that check all holes and shut down the machines if any incomplete holes or broken taps are detected, are provided in four stations of the machine. Machining units are Snyder standard type with hardened and ground ways; seven way-type units and eight self-contained units are used.

The machine is hydraulically-operated and electrically-controlled throughout. Separate hydraulic pump and tank units provide power for the way-type machining units. Each machine segment has its own individual control panel to facilitate maintenance and setup procedures. Automatic lubrication is provided for all moving parts. *Snyder Tool & Engineering Co.*

Circle 36 on postcard for more data

Jaw Assemblies

IMPROVED Iron Hand jaw assemblies have been announced that are said to be lighter, tougher and easier to maintain than previous assemblies, and to provide a 40 per cent increase in gripping force.

In the jaw itself the gripping area has been made smaller to give greater gripping force; and steel inserts (self-clinging when the jaw is closed) are easily replaced without the cotter key and solder method.

The piston rod is chrome-plated, and a Sahlin-type rod end piece allows the jaw to float independently of the cyclinder, eliminating tendency to bind and back-pin failure. It also lessens wear on bushings when the jaw is extended. In addition, the back cushion of the cyclinder can be removed or replaced quickly. All parts are tooled to insure interchangeability, and the fasteners used throughout are standard tool-crib items. *Sahlin Engineering Co., Inc.*

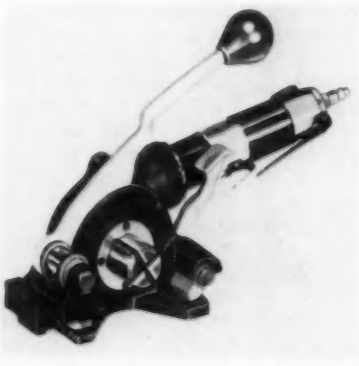
Circle 37 on postcard for more data

Strapping Tool

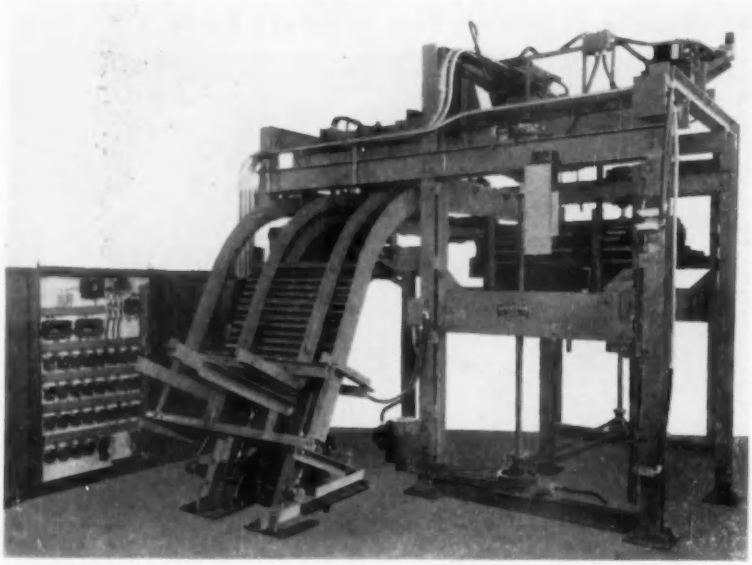
SERVING the dual purpose of tensioning and cutting, a new tool recently demonstrated is said to be the first air-powered unit of its kind introduced for heavy-duty strapping. It is designed for strapping on pallets, skids, car bracing, and large bundles; and operates on any flat stock or package. Weighing only 12 lb, it is easy to handle, reducing operator fatigue and increasing efficiency. Pneumatic power is claimed to insure uniform tension on each band. Called model PNC, it is available to users of heavy-duty strapping on a low-cost rental basis.

The company also has announced added facilities which will make possible the processing of more than 2000 tons of heavy-duty strapping per month, representing a doubling of capacity. *Brainard Steel Div., Sharon Steel Corp.*

Circle 38 on postcard for more data



Brainard PNC air-powered stretcher and cutter for heavy-duty strapping



Spurgeon automatic stacker handles either tubes or bars from a cut-off machine, and stacks them in a storage rack for delivery to subsequent operations.

Improved Automatic Tube and Bar Stacker

REQUIRING no hydraulic or air connections, a new automatic stacker is operated electrically and will handle tubes or bars from a cut-off machine and stack them in a storage rack ready for delivery to subsequent operations.

At the front of the machine there are two angle slides. As the tube (or bar) is released by the cut-off machine, these angle slides direct the tube to the bottom of the slide. Next, a pair of steel blades lifts the tube up above a pair of dogs into the curved section of the machine, pushing the previously handled tubes up the inclined section, forming a magazine fill. Then the entire layer of tubes is pushed to the top of the machine.

At the latter point, a mechanical drive assembly takes over to synchronize the action of the overhead transfer carriage and the lift table. The layer of tubes at the top of the machine is lifted by a grab, transferred horizontally until correctly positioned over the storage rack on the lift table, and deposited on the rack.

The overhead carriage then returns to its original position to await a new magazine fill. Meanwhile, the lift table is lowered a distance equivalent to the diameter of tubes. When the magazine is filled again, the operation repeats itself—a new layer of tubes is lifted, transferred to position above the storage rack, and deposited on the rack.

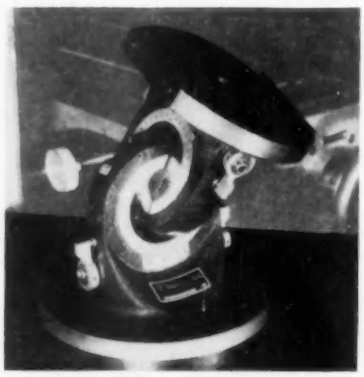
The lowering movement of the lift table continues after each layer of tubes is deposited, until the storage rack is filled. When full, the rack is automatically pushed from the lift table, and an empty rack is placed on the lift table. The lift table and empty rack then return to the uppermost starting position. *The Spurgeon Co.*

Circle 39 on postcard for more data

Quick-Set Fixture

OFFERED as a means of providing quick-set compound angles, a machine fixture called the Derry Triangulator has been introduced. It consists of two 360-deg protractors set at 90 deg to each other, with mounting plates top and bottom. By the use of quick-release clutches any compound angle on a spherical arc can be quickly set, locked, and adjusted to within one minute of arc accuracy. The device is said to be especially applicable for checking, drilling, grinding or boring operations requiring repeated setups. It comes in two sizes with 90-deg load capacities of 150 or 300 lb. *Machine Tool Div., Service & Suppliers, Inc.*

Circle 40 on postcard for more data



Derry Triangulator fixture

Parts Straightener

APPLICABLE where tolerances are important, a new small parts straightener is being offered as a means of obtaining maximum flatness of metal stampings which have become distorted during processing. The six-inch stock width model will process parts as thin as 0.010 in. and as short as two inches to within 0.001 to 0.002 in. in most cases. Eight and 12-in. stock width models will straighten parts down to three inches in length.

Cooper Weymouth small parts straightener

The bench-height self-contained unit is motor-driven. The 17 straightening rolls and two feed rolls are all power driven, with four individual gear trains. A single two-point adjustment applies and sets the pressure to the top bank of rolls.

A free-loop arm is available, enabling the machine to do double duty as a coil strip stock straightener. *Cooper Weymouth, Inc.*

Circle 41 on postcard for more data

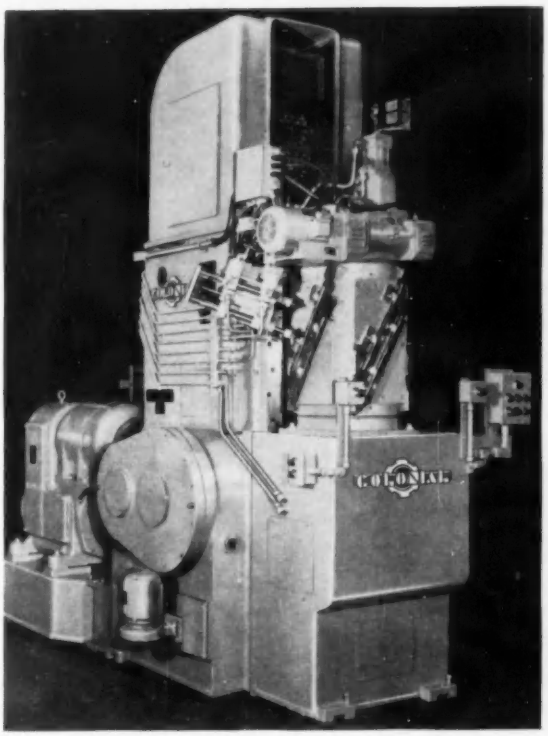
Oil Grooves in Rockerarm Shaft Broached Automatically

EIGHT oil-groove slots in an automotive rockerarm shaft are being automatically broached at a rate of 640 per hour at 80 per cent efficiency. The parts are broached on a 10-ton, 160-in. stroke, vertical-chain surface-broaching machine equipped with a four-station indexing fixture. Shafts are manually loaded, automatically probed for true position, broached, and automatically ejected in a cycle time of nine seconds.

The machine setup, engineered for continuous operation at a high production rate, is said to be able to maintain schedules for which two machines were formerly necessary. All movements are actuated by a special hydraulic circuit interlocked with the machine circuit for full service operation.

Pre-drilled shafts are loaded two at a time in a retaining fixture on the indexing face. The part is preliminarily held on pins in conjunction with a spring-loaded plunger. Positive holding action is accomplished at the cycle start by automatic clamping of two hydraulically-operated wedges. At the first indexing station, both parts are probed for correct hole locations by hydraulically-operated probe units. If improper positioning occurs, the machine automatically shuts off until the part is repositioned.

At the broaching station, the eight oil grooves (plus an identification notch) on both of the two parts are broached in one pass at a speed of 35 fpm. The grooves are angularly cut 30 deg to a radial depth of 0.06 in. The parts are automatically unloaded at the fourth station by air ejection.



Eight oil grooves are cut in each of two rockerarm shafts at one time in this Colonial unified broaching setup. Cycle time is nine seconds for a production rate of 80 parts per hour at 80 per cent efficiency. Sequence is: manually load and automatically clamp; position probe; broach both parts in one pass at 35 fpm; and air eject automatically. The machine is a 10-ton, 160-in. stroke, vertical-chain surface-broaching model.

The indexing fixture is a worm and worm-gear type Index drive is from a 1½-hp, 1200-rpm motor through an electro-mechanical clutch to the worm and worm wheel. Positioning is held by a hydraulically-operated shot pin engaging a four-position index plate. The main drum is guided on taper roller bearings at top and bottom.

The machine is a standard vertical-chain model, using an accepted broaching principle. Broach 'rams', platen-mounted on an endless chain, enter precision ways before contacting the work. The chain is used only to apply motive power to each ram. Smooth broaching action is obtained through a mechanical drive. *Colonial Broach and Machine Co.*

Circle 42 on postcard for more data

Welding Electrode

A HEAT-TREATABLE all-position electrode formulated for fabrication of chrome-moly and other high-tensile alloy steels has been announced. Featuring ease of application, the new EutecTrode 71 AC-DC is designed mainly for low alloy steels, particularly 4130, 4140 and 8630 grades. Deposits have similar heat-treating characteristics as the base metal. It exhibits an "as deposited" tensile strength to 100,000 psi. Possible applications include fabrication of tanks for high pressure work, aircraft landing gear and framework, and piping requiring high tensile strength.

The material can be used with reverse or straight polarity on dc; and is adaptable to overhead and vertical down welding. Dense, uniform deposits are obtained. Controlled solidification rate permits bridging of poor-fit gaps without burn-through. It is now available in 3/32, ⅛ and 5/32-in. sizes. *Eutectic Welding Alloys Corp.*

Circle 43 on postcard for more data

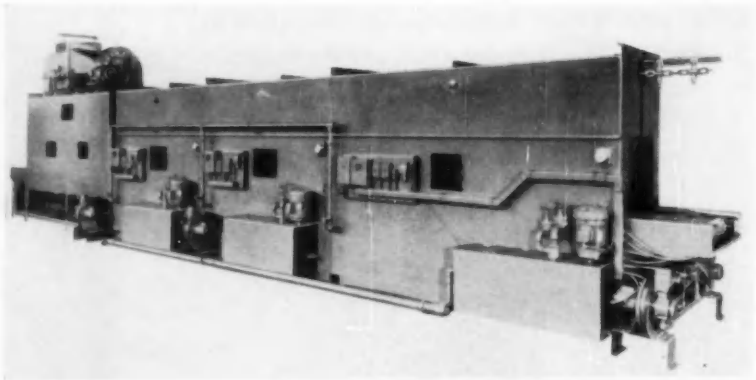
Anodizing Checker

FOR automatically checking the thickness of anodic coatings on aluminum, an instrument called the Anodicator has been introduced. Dielectric testing with the device is said to be a simple and reproducible spot-check on production to obtain anodic coatings conforming to specifications. It is also said to provide a reliable method of testing anodized aluminum and its alloys as specified in ASTM B110-45.

The device incorporates two factors in the measurement of dielectric strength: (1) a uniform, slow rate of voltage increase, and (2) uniform pressure of the probe on the anodic surface. It features a motor-driven voltage elevator; and automatically indicates the minimum voltage upon break-through, when a light appears. The toggle switch automatically resets to zero voltage for next test. Models with capacities of 1000, 2000 and 5000 v are available. *R. O. Hull & Co., Inc.*

Circle 44 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT



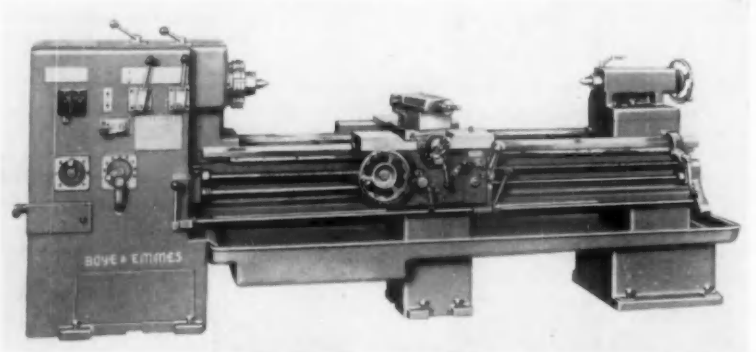
Alvey-Ferguson Model CP cleaning, phosphate coating and drying machine has both an overhead conveyor and a flat wire mesh belt conveyor for handling a variety of stamped parts through automatically-timed cycles

Cleaning, Phosphate Coating and Drying Machine

DESIGNATED the "Siamese Twin" Model CP, a new automatic cleaning, phosphate coating and drying machine is designed to handle a wide variety of metal stampings and to do the work of two machines. It incorporates both an overhead conveyor and a flat wire mesh belt conveyor to carry stamped parts through the automatically-timed cycles. Thus the machine can meet varying requirements of different stampings as to vertical or horizontal handling for the most effective power spray coverage and drainage. To allow maximum utility and versatility, the two conveyors can be operated simultaneously or may be operated independently.

First cost and operating cost are reduced by the use of a single tunnel through which the two conveyors pass, common solution tanks and spray systems, and common headers for water and drains. Leakage and wet floors are avoided by the use of new type vertical immersion pumps. Individual pressure-type gas burners are used to maintain proper temperatures in each solution tank. Provision has been made for easy access to spray areas and solution tanks to facilitate maintenance. *The Alvey-Ferguson Co.*

Circle 45 on postcard for more data



Lathe Has Headstock Designed for Heavy Cuts

The new lathe illustrated is designated 2516-series CB2. It is designed to give 25-in. max swing clearance over bed and carriage wings, and 16 in. over the cross slide. One of its outstanding features is the headstock design. The back gear shaft and gears are located in front of the spindle where the downward pressure of the gears neutralizes the effect of the tool lift under heavy cuts. The machine is built with hardened taper key drive or camlock spindle nose, hardened and ground steel bed vees, power rapid traverse, electrical stops, both longitudinal and cross feed. Eighteen spindle speeds up to 1500 rpm are provided. (The Boye & Emmes Machine Tool Co.)

Circle 46 on postcard for more data

Aluminum Cleaner

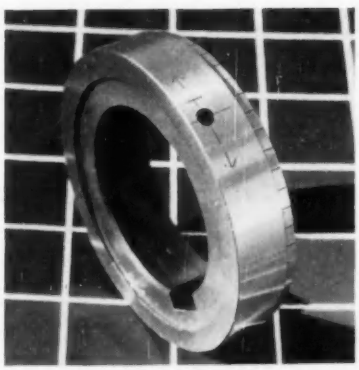
DEVELOPMENT of a liquid combination of solvents, safely inhibited acid and detergents for cleaning and brightening aluminum without scrubbing or polishing, has been announced. Called Lumabrite, the product was designed to clean and brighten aluminum vehicle bodies and aircraft skins, as well as aluminum parts and stainless steel cars. It is also recommended by the company for use on all stainless steel, copper, enameled and lacquered surfaces.

Diluted with 5 to 10 parts of water, depending upon the condition of the surface to be cleaned, the material in one operation cleans, degreases and brightens aluminum. It gives off no toxic fumes, is non-flammable, and can be used indoors or outdoors. *Penetone Co.*

Circle 47 on postcard for more data

Adjustable Collars

MICROMETER adjustable spacing collars for milling machine cutter arbors are in improved series now ready for distribution. Made of hardened and ground alloy steel, sizes



Dayton Rogers adjustable spacing collar for milling machine cutter arbor

range from ⅝ to 3 in. for all standard cutter arbors.

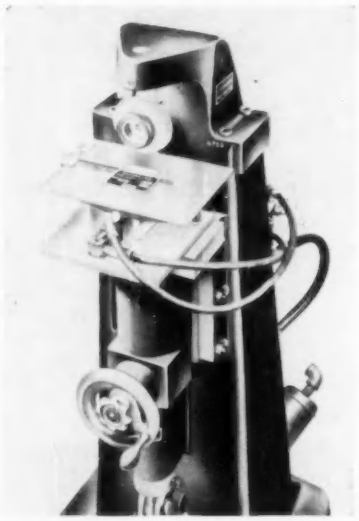
The outer barrel of the collar is marked so that it can be adjusted plus or minus against the thousandth graduations of the inner barrel. Adjustment is by means of a furnished spanner wrench. The graduations are so spaced that 0.001-in. adjustments may be readily obtained. Positive spacing when the collars and cutters are locked on an arbor is said to result. *Dayton Rogers Manufacturing Co.*

Circle 48 on postcard for more data

Marking Machine

USABLE for marking details into nameplates or other metal components, a recently-introduced power detail stamping machine can mark plates from 1/32 in. thick to die components or other parts up to four inches thick. Shop air pressure is used for power, the requirements varying from 20 to 40 lb depending upon the depth of impression desired.

The machine can be equipped with dials ranging from 1/16 to ¼ in. Only three minutes' time is needed for changing dials. All are engraved with 27 letters, 10 figures, period, fraction line and dash. *Geo. T. Schmidt, Inc.*



Schmidt floor model power detail press

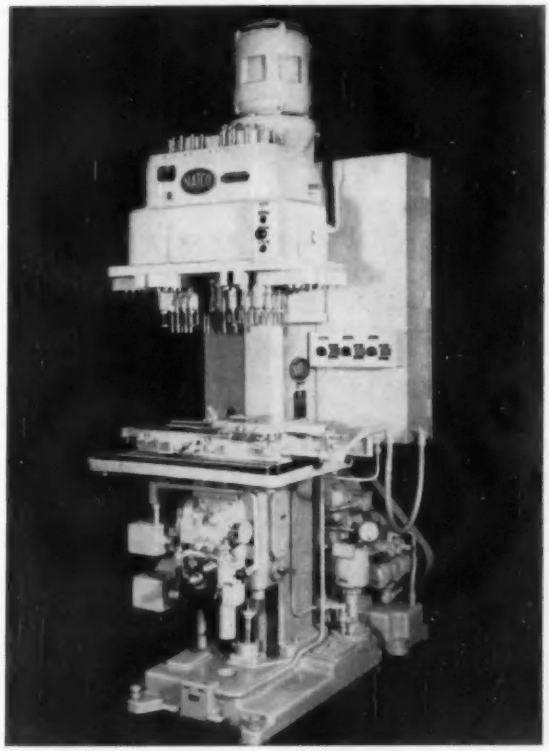
Circle 49 on postcard for more data

Cast Iron Collets

IN order to prevent or reduce scratches and mars on stock being cut off on automatic Modern cutting-off machines, the company is now producing fine grain cast iron collets and feed rolls. The collets are divided into five moving segments to provide positive gripping of stock that may be slightly out of round. It is said they do not mark or scratch the work as much as collets made of hardened steel, and that they last as long or longer.

When polished stock is being cut off, the company now furnishes a cast iron bushing that fits into an inner tube so that the stock never touches the collet. In certain cases a cast iron inner sleeve is used at the rear of the guide bushing to prevent scratches. *Modern Machine Tool Co.*

Circle 50 on postcard for more data



Natco Model H-6 multi-spindle machine with adjustable spindles, three-position indexing slide, and selector switches. Over 100 combinations of operations—including drilling, tapping, step drilling, chamfering, countersinking, counterboring and spotfacing—can be handled by this machine and its equipment.

Automatic Multi-Spindle Drilling Machine

ANNOUNCEMENT has been made of a new standard arrangement of the Natco H-6 multiple-spindle drilling and tapping machine. The machine is now available with preset selective cycle control and a straight-line indexing slide.

In operation, the operator unloads the finished part, loads a new one and depresses the starting switch. The machine then goes through all operations, and returns to the loading position. Over 100 combinations of operations are said to be possible—simply by setting selector dials. Machining operations obtainable include combinations of drilling, tapping, step drilling, chamfering, countersinking, counterboring, and spotfacing.

Table movements in the drilling cycle consist of rapid traverse up, feed up and rapid traverse down. In the tapping cycle table movements are rapid traverse up, feed up, feed down and rapid traverse down. The chamfering cycle (including countersinking, spotfacing, etc.) is rapid traverse up, feed up, dwell and rapid traverse down. The table can also be arranged to travel a further distance for drilling than for chamfering operations.

Table feeds are controlled by means of two dials, one for drilling and another for tapping. Taps of different leads can be used because of the vertical float arrangement built into the spindles.

The hydraulically-actuated indexing slide is electrically-controlled by means of the selector switches, and is available with 2, 3, 4, or 5 positions. Various workholding fixtures can be mounted on the slide.

The basic machine consists of a multiple-spindle geared head and a hydraulic feed table. Spindles are driven through universal joints; and they can be arranged with adjustable arms for positioning or can be fixed in the required layout by a slip spindle plate fastened to the head of the machine. Up to 24 spindles can be used on the machine depending primarily upon horsepower consumed. Spindle drive motor is three horsepower on the standard model and five horsepower on the heavyduty machine. *National Automatic Tool Co., Inc.*

Circle 51 on postcard for more data

HOW MANY WAYS CAN *Special Purpose Fasteners* CUT COSTS FOR YOU?

How many of your products employ laborious, old-fashioned fastening methods where simple fasteners could do the job and cut costs, too? How many parts and sub-assemblies can be adapted to include a self-fastening feature? How many future products could be improved by advance planning for fastener efficiency?

United-Carr's engineering staff offers you a wealth of experience in the design of special-purpose fasteners and self-fastening devices. Large-scale manufacturing facilities (including in-plant plastics molding equipment) ensure economical, *volume* production and prompt deliveries. United-Carr field representatives are ready to call on you at *your* request.

POLYETHYLENE MOUNTING FOOT

No mar, no scratch glide for use on TV receivers, record changers, small appliances, etc. Assembles into round hole in wood or metal cabinets.

NYLON SNAP-IN NUT

Snaps into square hole stamped out of sheet metal . . . provides secure anchorage for any sheet metal or self-tapping screw . . . highly effective electrical insulator.

QUICKEY FASTENER

Eliminates need for welding or swaging studs to sheet metal stampings, facilitates nesting, eliminates damage in transit because Quickey snaps in before final assembly.

THREAD CUTTING FASTENER

Re-usable, self-locking, vibration-proof fastener cuts clean, deep threads on unthreaded chrome-plated studs. Available for ⅛", 5/32" and ¼" studs.

PLUG BUTTONS

Snap into ⅛" to 3" dia. holes. Can be embossed with ornamental or functional designs . . . various finishes, shapes and sizes.

FISHTAIL RATCHET PLATE

Holds on smooth, die-cast metal or plastic studs to anchor name plates, trade marks etc. on appliances, automobiles, electronic apparatus, etc.

TRIMOUNT STUDS

Hold two or more thicknesses of material together. Easily installed by hand. Insure vibration proof attachment. Permanent or removable. Many shapes and sizes.

V-LOCK TEENUT

Re-usable, self-locking, one-piece, all-metal nut has high tensile strength, is unaffected by heat or oils. In various shapes, sizes and metals.

SOL-A-NUT

Self-locking, rustless, heat resistant. Sturdy, one-piece stainless steel construction prevents corrosion if nicked or scratched.

DURABLE DOT FASTENER

Snap fastener for cloth, leather, plastics and other materials. Positive closure, instant release. Black, nickel or brass finish.

CARR FASTENER COMPANY

Division of United-Carr Fastener Corp., Cambridge 42, Massachusetts

MAKERS OF DOT FASTENERS

Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Drive Units 1

A new line of electro-magnetic cycling drive units which provide start-stop and repetitive cycle control for various types of mechanical drive systems from fractional to 75 hp is covered in a 12-page brochure issued by *Cycledynamics Inc.*

Heat Treating 2

Bulletin SC-178, eight pages, discusses modern gas chemistry and analyzes its ability to upgrade and protect metals in quality heat treating. *Surface Combustion Corp.*

Automatic Control 3

A 44-page bulletin on pneumatic control instruments and automatic control theory discusses the basic concepts of narrow band, proportional, reset, derivative, and reset plus derivative control actions. *The Bristol Co.*

Epoxy Paints 4

The improved properties of epoxy paints that result when they are modified with liquid polymers are briefly outlined in a pamphlet and fully covered in a technical brochure issued by *Thiokol Chemical Corp.*

Plastics 5

A 12-page booklet features examples of plastic fabrication methods and includes a chart showing the characteristics of a series of thermoplastics. *L. A. Darling Co.*

Aircraft Steels 6

Four-page technical bulletin 13-2 lists the elevated-temperature physical properties of three grades of hot work tool steel for aircraft structural parts. *Firth Sterling, Inc.*

Steel Tubing 7

Data Chart Sec. B No. 1 lists and explains tolerances for both seamless and welded mechanical tubing, and seamless and welded stainless steel tubing and pipe. *Peter A. Frasse & Co., Inc.*

Conveyor Systems 8

A 16-page brochure describes the functions of power and free conveyor systems and shows a variety of applications. *Jervis B. Webb Co.*

Industrial Ovens 9

Bulletin 157, 16 pages, lists a complete line of industrial ovens and accessories for baking, drying, curing, and heat treating. *Young Brothers Co.*

Metal Treatment 10

An 84-page booklet discusses latest developments in rust prevention, mechanical and chemical cleaning, blackening, phosphating, and other aspects of metal surface treatment. *E. F. Houghton & Co.*

(Please turn page)

VOID After Sept. 15, 1957 **7/15/57**

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FREE LITERATURE—*Continued*

Deep Hole Drilling 11

Gun drilling of difficult materials and unsymmetrical workpieces, such as manifolds and valve bodies, or symmetrical pieces, such as injection cylinders and aircraft pins, is discussed in a four-page catalog issued by *Deep Hole Specialists, Inc.*

Bar Machines 12

Single spindle automatic bar machines, designed for a wide range of turning and forming operations, are covered in a four-page bulletin. Called Model B, capacities are 1⅝ and 2½ in. *The Cleveland Automatic Machine Co.*

Motors and Drives 13

An eight-page booklet describes a complete line of a-c and d-c motors, gearmotors, motor-generator sets, motor controls, and packaged mechanical and electronic adjustable-speed drives. *Reliance Electric and Engineering Co.*

Honing Tools 14

Bulletin 570, four pages, explains the features of latest honing tool designs, and lists the range of sizes and types of bores for which they were developed. *Barnes Drill Co.*

Leaded Steels 15

A 16-page booklet contains new information on the basic characteristics, mechanical properties, and workability of leaded steels. *Copperweld Steel Co.*

USE THIS POSTCARD

Index Table 16

Bulletin JF-57, four pages, contains information on the design, operation, and application of a universal table that incorporates a no-backlash gear mechanism for high-precision indexing control. *Colonial Broach & Machine Co.*

Arc Welding 17

Catalog 2300, 20 pages, discusses the tungsten arc Heliweld process, and includes information on various types of equipment and accessory devices. *Air Reduction Sales Co.*

Cutting Oils 18

Booklet PC-347 outlines the properties of a new group of chemically formulated oil base additives which are designed primarily for cutting oil applications. *Cincinnati Milling Products Div., Cincinnati Milling Machine Co.*

Gage Plugs 19

A handy selection chart lists a line of gage plugs for comparators with Jacobs chucks, and includes sizes and specifications. *Pratt & Whitney Co.*

Stainless Steel 20

A 32-page booklet on stainless steel sheet and strip includes a stainless steel finder, and detailed data on various stainless steels and their fabrication properties. *Allegheny Ludlum Steel Corp.*

Precision Balls 21

Comprehensive data on precision balls made of aluminum, brass and bronze, carbon steel, chrome alloy steel, glass, K-monel, plastic, and stainless steel are given in a catalog issued by *Hartford Steel Ball Co.*

Metallic Putty 22

Bulletin 11, four pages, describes an aluminum-filled epoxy resin compound designed for use as a putty in aircraft, marine and metal-working applications. *Smooth-On Mfg. Co.*

Zirconium Oxides 23

Bulletin 57, four pages, presents detailed information on zirconium oxides, including applications, types, and manufacturing methods. *Zirconium Corp. of America.*

Pipe and Tubing

A 48-page catalog covers a line of stainless steel and high-alloy pipe and tubing ranging in size from ⅛ in. to 40 in. OD. *Write on company letterhead to: L. E. Baker, Sales Supervisor, Trent Tube Co., East Troy, Wis.*

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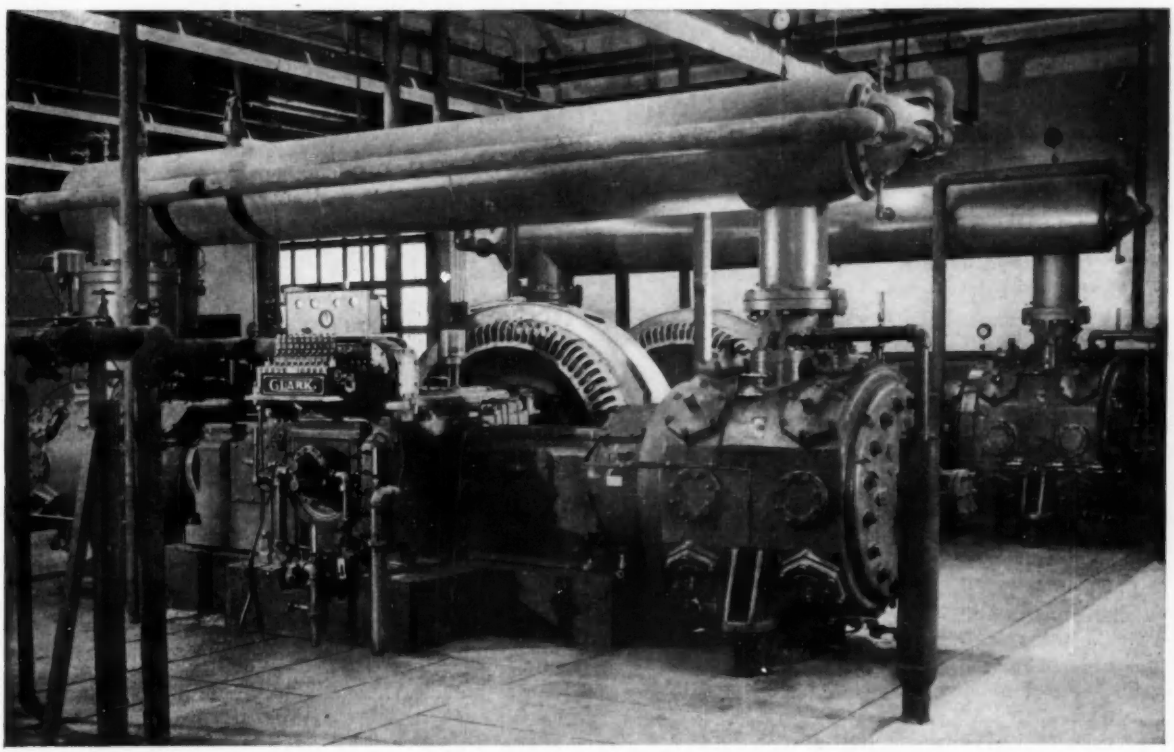


What Jules Verne couldn't foresee!

Around the world, 24,325 miles of it, in 45 hours and 19 minutes... our strategic B-52 bombers did it non-stop! This speedy trip made Jules Verne's "80 days" seem like a lifetime. Part of the B-52 – the electrical pneumatic units that drive generators to provide the muscle for operating flaps, gun turrets, radar and countless other operations are provided by Thompson Products, Inc. of Cleveland, Ohio. Four of these 205 horsepower units go into every B-52. To be certain they are perfect, Thompson gives them a thorough test before shipment. One 350 horsepower Clark CMA-4 and two Clark 600 horsepower CRA-2 air compressors furnish the air for testing.

There is a vibrationless Clark balanced/opposed compressor for practically every requirement. Sizes range up to 6000 horsepower. Your nearest Clark representative has all the facts.

CLARK BROS. CO. **OLEAN, NEW YORK**
One of the Dresser Industries
Offices in Principal Cities Throughout the World

CLARK **Balanced/Opposed Compressors**

News of the MACHINERY INDUSTRIES

E. W. Bliss Co. Continues to Expand in Size and in Activities as it Completes First Century of Existence

By Thomas MacNew

TURNKEY plants, new technological advances in industrial products, and a greater emphasis on research in new materials and methods start off the second century of the E. W. Bliss Co. From 1857 to 1957, the company enjoyed good corporate growth marked by new products, entrance into new fields, acquisition of other firms, and sound engineering and marketing principles. That is history. What looms ahead for the big industrial equipment builder looks even more impressive.

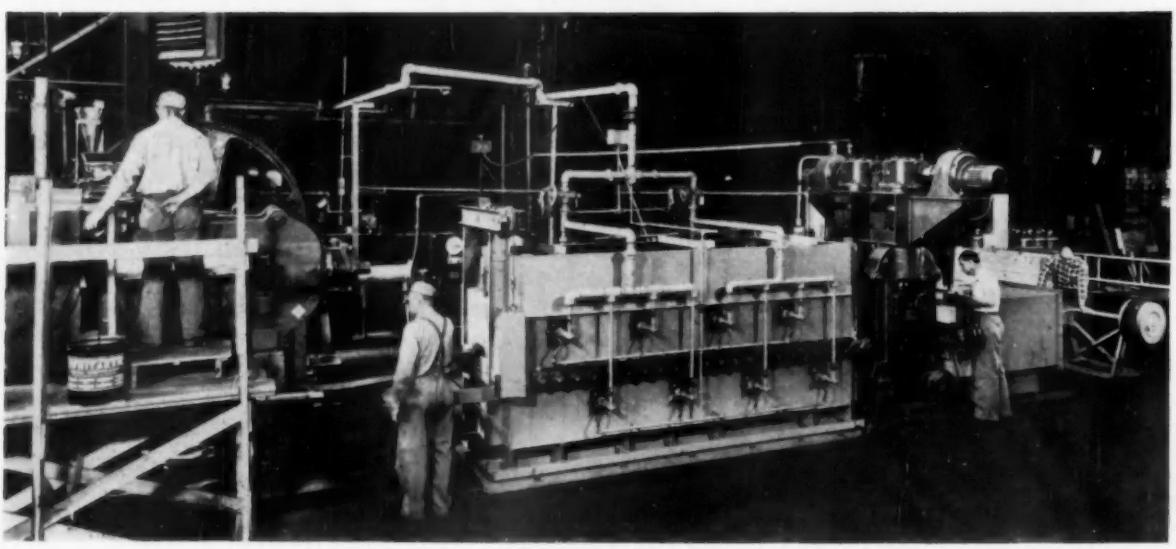
Robert Potter, president of the company which had a sales volume of over $86 million last year, told a press conference of trade editors that Bliss has taken on an entirely new dimension in which the company is now to expand. The concept—"turnkey plants."

Actually, the idea started on a big scale with the Bliss rolling mill division which is completing such a plant for the Cleveland Div. of Jones & Laughlin. Bliss acted as the contracting engineer for the entire $18 million operation from the foundations to the mills and mill accessories. All Jones & Laughlin has to do is get the key from Bliss, open the door to the plant, and start operations.

Therefore, according to Robert Potter, the E. W. Bliss Co. is now ready, willing and able to provide a complete turnkey plant service, not only in rolling mills, but in other fields such as metal powder strip lines, can-making machinery, and metalworking presses. Bliss can provide a customer with everything he needs, from a survey of the economic advantage or disadvantage of operating his own plant right up to building the plant and getting it running smoothly. He said that Bliss can work with the customer directly, or with any consulting engineering firm he may choose. The fact that Bliss can offer, right from the start, the advantage of a contract-cost plant, takes away a good part of the risk a company ordinarily faces when it enters a new field of activity.

One of the biggest departures made by Bliss lies in the field of powder metallurgy. The method—rolling strip, tubing, and other metal shapes directly out of metal powder without first melting the powder into cakes or ingots. Mr. Potter claims 80 per cent savings over conventional rolling methods. A pilot production line is running at the company's Salem, Ohio, plant. So far, copper, nickel, titanium, and iron have been processed successfully. Chemetals in New York holds exclusive Ameri-

First illustration ever released of a new powder metal sintering line developed by the E. W. Bliss Company's Rolling Mill Division. Under this revolutionary new process, metal strip, tubing and other products can be fabricated directly from powder. Metal powder feeds from the hopper at top left through compacting rolls, and is then passed through a sintering furnace and the hot mill rolls. The finished strip compares favorably with fine strip rolled by conventional multi-cycle rolling techniques.

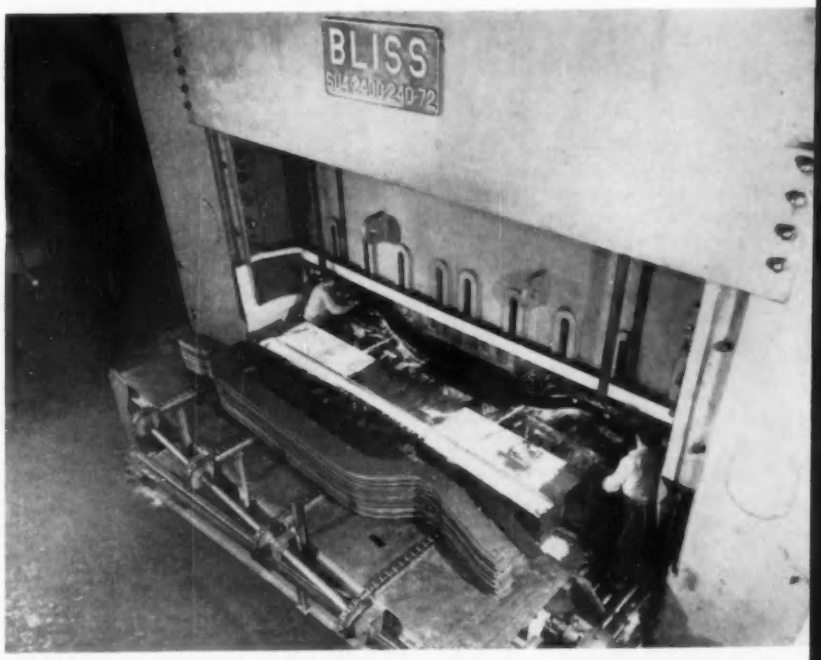


can rights for this German development. Bliss has bought into Chemetals and has played a major role in designing and building the special equipment needed to process the powder into strip or tubing.

In the metalworking press field, Bliss engineers are developing an electronically-controlled, electromagnetic press drive especially aimed at today's split-second production speeds. Besides all normal press controls, the new drive makes possible an instantaneous and almost limitless range of clutching and braking proportions —and makes practical any combination of approach, working speed and return speed within the capacity of the press. Electronic circuits regulate the flow of direct and alternating current which in turn control clutching and braking proportions through an induced magnetic field. Direct current creates a magnetic clutching action in which the rotor is locked to the flywheel. Alternating current creates a reverse rotating field which slows and reverses the press. The flow of both types of current is electronically controlled according to previous settings made on the control panel. Since clutching action is electro-magnetic, speed changes are virtually instantaneous. Two possibilities inherent in the new drive are that it could control all standard press accessories and coordinate the activities of an entire line of presses.

Looking in the crystal ball, Bliss engineers foresee inclinable presses with speeds of 3000 or 4000 strokes per minute. With such speeds more mass would have to be built into the frame, taking it out of reciprocating parts. This opens an avenue for new and lighter metals in the press field. Also, the engineers see much progress in the idea of a dial-type feed carrying work successively to different presses arranged in a circular pattern, with little or no manual handling. For controls, the Bliss people see the use of transistors in the not too distant future.

This all adds up to great strides in progress and the next 10 years requires more technological advance than the first 100 to stay alive in this era of rapid change.



This Bliss underdrive mechanical press, largest of its kind in the world, is used by Parish Pressed Steel Co., Reading, Pa., to produce automobile chassis side rails. Average production rate is eight pairs of rails per minute. The press capacity is 2300 tons and its total weight is 1,250,000 lb.

This five-stand tandem mill built by Bliss for the Kenosha Div. of American Brass Co. is used to produce automobile radiator copper. The material is reduced from 0.018 in. to 0.0035 in. and in varying strip widths. High speed coil changing equipment, also designed by Bliss, is used with the mill.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

British Car Exports Establish New Record

British car exports hit a new peak in May, when more than 41,500 units worth £15 million were sold to buyers all over the world. This was 2000 more than the previous record set in July, 1954.

Car shipments included a record 8000 units sold in the U. S., now the British industry's leading export market for cars.

Over the five-month period ending in May, car and commercial vehicle exports totaled 218,500 at £98 million, compared with 210,000 at £91 million for the same period last year.

Air Force To Demand More for Its Money

Stretching the aircraft dollar to its fullest is the big problem that faces the U. S. aircraft industry.

This point is hammered hard by top Air Force officials: No padding will be permitted in the performance of contracts for planes or missiles. Any method or project that wastes money or scarce skills is to be dropped. Discussing today's dollar difficulty, which stems from the complexity of both missiles and manned aircraft systems, Air Force Secretary Douglas told more than 100 aircraft company officials recently:

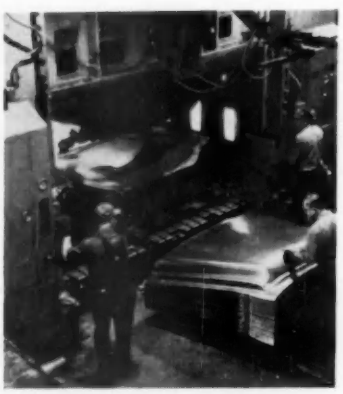
"In the future we must be more highly selective in the pursuit of our development and production program. We are now at a point where we must exercise a great deal of ingenuity in order to continue certain essential programs at a relatively lower rate without unit cost being unacceptably high."

Assistant Secretary Sharp, principal material official for the Air Force, said the service must act drastically to cut the spending rate without undermining combat strength. He also told industry executives candidly that fewer production plants will be needed to supply the Air Force.

His statement backs up a forecast, given in May by Maj. Gen. David H. Baker, that fewer prime contractors will be required and opportunities for airframe subcontracting will decline. Gen. Baker is director of procurement and production, Air Material Command.

DUMP TRUCK

German dump truck with 22-ton load capacity tilts its 16-cu yd body to 70 deg in 15 seconds. The "Kaelble 200" is powered by a 1459 cu in., V-8 Diesel engine developing 200 bhp at 1400 rpm, and has a six-speed gearbox. With optional all-wheel drive the front wheels incorporate epicyclic reduction gears to permit a smaller forward differential and higher ground clearance.



DANLY PRESS AT IHC

Here is one of two large presses recently installed at the Springfield Works of International Harvester Co. This 700-ton, double-action Danly model enables the plant to produce such large stampings as side panels and roof panels. It will take dies up to 96 by 132 in. and has a speed of six strokes per minute. Of underdrive construction, the 500,000-lb unit is equipped with four motors; main drive motor is rated at 75 hp.

Synthetic Rubber Use Hit New High in May

Consumption of synthetic rubber in the U.S. during May amounted to 79,710 long tons, according to the monthly report of The Rubber Manufacturers Association, Inc. This figure represents 63.25 per cent of the total of 126,029 long tons of new rubber consumed during the month, a new high since the removal of government specification control.

To support synthetic use, American producers set a new all-time monthly high by producing 95,049 long tons of all types of synthetic rubbers. The previous record was set in March 1956, when 94,389 long tons were produced.

U.S. Airlines Will Get 600-Mph Planes in 1958

Beginning in 1958, U.S. commercial transport manufacturers will start delivering at least 200 turboprop and 320 pure jet transports to air carriers in this country and abroad, according to the Aircraft Industries Association. These aircraft, already in various stages of production, will travel at speeds as high as 600 mph.

Planes, official publication of the AIA, also reports that U.S. transport manufacturers are still scheduled to deliver 400 piston transports to foreign and domestic carriers.

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U. S. Patent No. 2,789,872

6

advantages carbon steel rings don't have

- holds full tension at engine operating temperature
- highly resistant to corrosion
- actually hardens in use
- side-sealing because of axial pressure of expander
- conforms independently of ring groove depth
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Chrome-plated steel side rails for more than double normal ring life

Let our engineers give you full details—including exceptional performance data in cars of one of America's largest builders

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Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911
Largest Producers of Sealing Rings for Automatic Transmissions and Power Steering Units

told industry executives candidly that

unit is equipped with four motors; main drive motor is rated at 75 hp.

deliver 400 piston transports to foreign and domestic carriers.

AIR BRIEFS

By RALPH H. McCLARREN

New High Energy Fuel

A very high energy fuel for aircraft and missiles is being developed for the Navy Department. The Armour Research Foundation of Illinois Institute of Technology has developed a combination of boron, carbon and hydrogen as a new aircraft fuel which will extend the range of an aircraft, permit reduction in the weight of the airframe, increase the payload and improve the aircraft's performance in speed and rate of climb. Another advantage of the new high energy fuel is its ability to burn at high altitude where ordinary fuels will not.

Research on the new high energy fuel has reached a point where a $38,000,000 plant is now under construction.

Largest Periscope

What is believed to be the world's largest periscope has recently been installed at the Atomic Energy Commission's National Reactor Testing Station in Idaho Falls, Idaho. The periscope, contained in a 90 ft long aluminum tube, incorporates an intricate mirror and lense system to permit observation of a nuclear reactor while the worker sits safely behind heavy shielding.

The periscope was constructed by the General Electric Co. at Evendale, Ohio, under contract with the Atomic Energy Commission and the Department of the Air Force. A unique feature of the periscope is its ability to keep the image erect while the scanning mirror of the periscope moves. Submarine periscopes are not confronted with this problem because the observer moves with the periscope. The problem was solved in the new large periscope by installing a motor driven assembly of three mirrors. These mirrors automatically keep the image erect to the viewer.

Ryan X-13 Vertijet

An historic moment in the annals of aviation took place on April 11, 1957, at Edwards Air Force Base, Calif., when test Pilot Pete Girard made a vertical takeoff and high speed jet flight and a vertical landing with the Ryan X-13 Vertijet. We recently saw motion pictures of this historic flight at the Pentagon in Washington, D. C., and also during the Annual meetings of the Aviation Writers Association recently held in St. Louis, Mo. The phenomenal performance of this pure jet aircraft culminates a 10 year research and development effort at Ryan Aeronautical Co., San Diego, Calif.

The Navy awarded Ryan a Research & Development contract in April 1947. In May of 1951 the test vehicle made the world's first free hovering jet flight. An improved test vehicle was later developed and flown in 1952. Then in August 1953, with the cooperation of the Navy Department, the U. S. Air Force awarded Ryan a contract to design, fabricate and flight tests two X-13 Jet vertical takeoff and landing research planes. It was one of these that made the complete flight on April 11, 1957, demonstrating the full cycle of VTOL operation.

This type of aircraft eliminates the need for mile long runways and large landing fields synonymous with jet aircraft. In fact, two trees with a cable suspended between them would provide a landing area for the new Vertijet. It doesn't take much imagination to visualize what a superior vehicle the Vertijet would be for close support of ground troops; also intermediate operations in time of war. Then, too, it proves a principle which could easily be incorporated into a vertical takeoff and landing type of commercial aircraft.

Liquid Rocket To Boost Missile

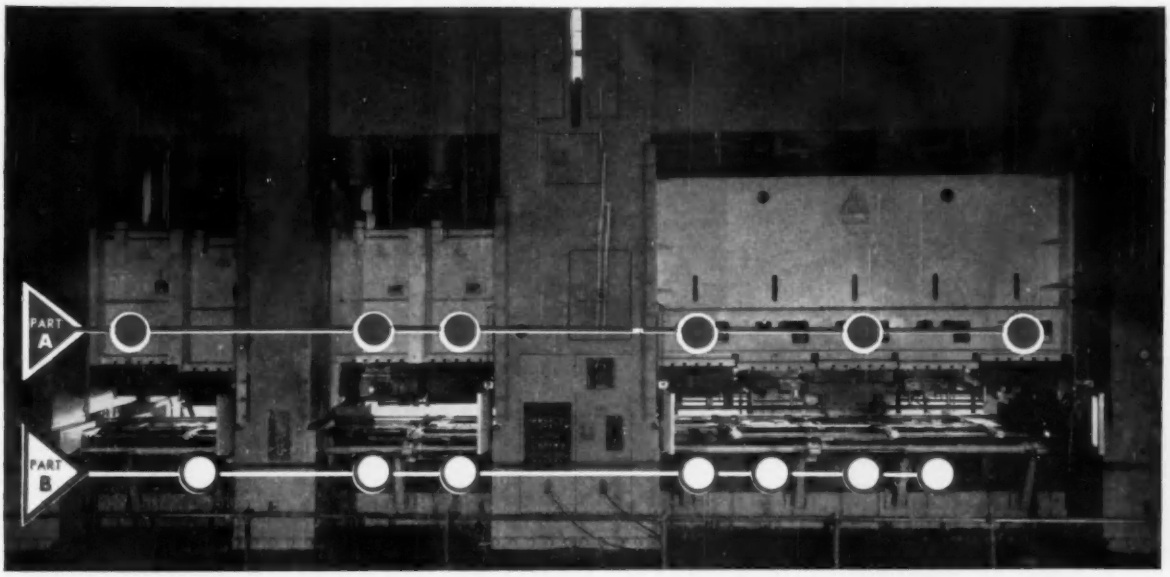
Aerojet-General Corp. is building a liquid fuel rocket motor used to launch the Bomarc IM-99 ground-to-air interceptor missile. Bomarc is built under contract for the U. S. Air Force by the Boeing Airplane Co.

The missile is launched vertically, utilizing the liquid fuel rocket motor for power to rise from the ground and reach supersonic speed. When it reaches a speed suitable for the ram jet engine in the Bomarc to take over the rocket motor cuts out and is ejected. The Bomarc, known as an "area defense weapon", will be operated by the Air Defense Command from bases where its range capabilities may be fully utilized. It weighs 15,000 lb and has been described as having a "high explosive warhead."

Aviation Safety Awards

Thirty-six U. S. Airlines have been named winners of the National Safety Council's highest award—the Award of Honor—for operating through 1956 without a passenger or crew fatality in air accidents. Of these 36 airlines, 22 of them have operated since the airline was established without one

(*Turn to page 118, please*)



A Clearing modular press equipped with one large single slide and two pairs of split slides produces washer tops for several hours, then converts in minutes to producing dryer tops.

QUESTION: HOW CAN CLEARING TRANSFLEX SLIDE PRESSES HELP YOU BEAT THE COST $QUEEZE?

ANSWER: BY PROVIDING A WHOLE NEW BAG OF TRICKS THAT WILL INCREASE YOUR PLANT'S PRODUCTIVITY.

Q. Does operating a Clearing multiple slide press present a major advantage over automating a number of individual presses?

A. Individual presses will do the job. However, the main advantage with a single, multiple slide machine lies in greatly increased productive potential because it can operate continuously. Then too, there's the lower initial cost and lower operating costs of running a single machine—less manpower, less floor space required, less overhead.

Q. Why multiple slides rather than a single large slide?

A. Multiple slides make it possible to correct unbalanced loading—a more or less natural condition when trying to run a number of dies in a single press.

Q. What are split slides?

A. Split slides are actually two individual slide elements placed side by side between a common pair of uprights. They provide for unbalanced load conditions and facilitate almost instant production changeover by making it possible to adjust dies into, or out of, the operation.

Q. What about skip stroke?

A. Skip stroke enables a manufacturer to produce two parts at alternate strokes of the same machine. The slide has an internal mechanism which raises the punch at every second stroke so that parts passing through these stations are untouched. Split stroke combined with split slides makes a number of production combinations possible.

Q. How about sub-slides?

A. Sub slides are a good way to individually adjust dies on a single large slide. Sub-slides are another way to make quick production changes by manipulating slide adjustments.

Q. Is there more detailed information available on Clearing Transflex slide arrangements?

A. Just write us. We'll send our bulletin SB33.48 without delay.

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION *division of* **U. S. INDUSTRIES, INC.**

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fronted with this problem because the observer moves with the peri-

mous with jet aircraft. In fact, two trees with a cable suspended be-

airline was established without one

(*Turn to page 118, please*)

The BUSINESS PULSE

Over-all Business Activity Lacks Clear-Cut Directional Trend. Upturn in Housing Viewed as Hopeful Sign. Tighter Money Market Reflected in Higher Rates for Treasury Short-Term Financing and in Increased Bond Yields.

As the economy moves into the second half of the year, economic visibility is still limited. Business shows no clear-cut directional trend, and there seems little probability of any real clarification until after Labor Day, since movements during the summer period (when seasonal swings in many industries are pronounced) are always exceedingly difficult to evaluate with accuracy.

The continuing intense demand for both short- and long-term funds would suggest that inflationary pressures are still very strong. And this judgment is strengthened by the fact that upward price tendencies are still evident in some sectors of the economy. But side by side with this experience, there are a good many signs of sluggishness. Over-all measures of business activity in general are showing little more than horizontal drift, and in some cases (industrial production being the most notable) they are actually moving lower.

Industrial Production Declines

On a seasonally adjusted basis, industrial production fell in May for the third consecutive month to 143 per cent of its 1947-49 average. This compares with a 1956 peak (attained in December) of 147, and it approximates the monthly average of the last quarter of 1955. The fact that industrial production has been moving moderately downward since the end of 1956 is not too surprising, considering that businessmen have shifted during the past half year from a policy of inventory accumulation to one of at least moderate liquidation. Actually,

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

there is reason for satisfaction that the decline has been relatively mild. But the fact that industrial production today is no higher than it was in the final quarter of 1955 is regarded by many economists as a decidedly poor record.

Sluggishness is further evidenced by the course of retail trade. Although close to record levels of late, total sales have shown virtually no growth over the past nine or ten months, despite the upward tendency of retail prices. Automobile sales account for this record in part, since they are still not very buoyant.

Equipment Buying Moves Up

Perhaps the most reassuring development of the past month was the indication, supplied by the Government's latest survey of businessmen's investment intentions, that plant and equipment outlays are likely to continue moving upward on a seasonally adjusted basis through the third quarter of the year. Previously there has been considerable concern that this type of spending had already begun to turn downward. The favorable outlook in this sector suggests that higher interest rates are not proving a significant deterrent to expansion, and it also indicates that general sentiment is still strong.

However, there is some question as to whether the prospective rise in this area, if it does occur, will be sufficient by itself to improve significantly the over-all business trend. The consensus is that some additional stimulus will be necessary. The customary upsurge in automobile output in the final quarter of the year could meet this requirement, if consumer interest in the new models is keen enough to justify the extension of high-level production schedules well into 1958. This will certainly be a crucial area to watch after Labor Day, as will developments in home building and inventory policy.

There is some evidence of a possible turning point in housing construction. Privately-financed nonfarm housing starts rose in both April and May on a seasonally adjusted basis, after five months of uninterrupted decline. This may have been in response to the upward adjustment to the more realistic 5 per cent level in the permissible mortgage rate on FHA-insured mortgages that went into effect in December. This experience is encouraging, although it is still too early to be sure whether the previous weakness in housing has definitely been corrected.

Money at a Premium

Money-market developments have commanded a good deal of attention in the recent past. In June the demand for funds far outpaced the supply, with the result that the cost of money in the open market was driven sharply upward.

In part this was a reflection of heavy borrowing by corporations to meet income tax payments due

(*Turn to page 129, please*)

WHY YOU GET BETTER HIGH SPEED INTERNAL GEARS AT MINIMUM COST WITH RED RING NALOY BROACHES

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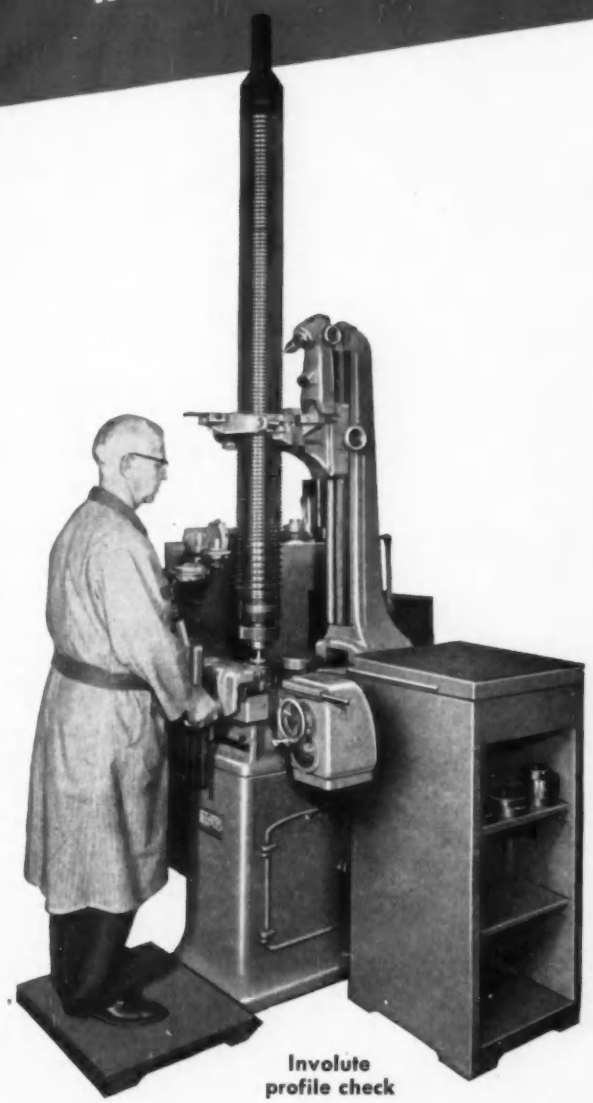
- All gears produced are interchangeable regardless of the number of broaching tools in use.

The secret of combining spectacular economy with such high gear precision lies in the broaching tools themselves. Special manufacturing processes are used. Each is under the constant control of Red Ring metallurgists and engineers in this company's own plant.

The real proof of Red Ring methods is reflected in actual performance figures. Ask to see them.



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tory accumulation to one of at least moderate liquidation. Actually, general sentiment is still strong.

However, there is some questio

to meet income tax payments due

(*Turn to page* 129, *please*)

• • INDUSTRY STATISTICS • •

1957 WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending June 29	Weeks Ending June 22	Year to Date 1957	Year to Date 1956
PASSENGER CAR PRODUCTION				
Hudson	28	17	1,345	4,323
Nash	83	132	3,561	11,037
Rambler	2,284	2,375	50,600	45,498
Total—American Motors	2,395	2,524	55,506	60,858
Chrysler	3,145	2,287	72,614	64,753
De Soto	726	2,051	72,868	57,041
Dodge	7,528	6,733	170,622	106,522
Imperial	1,133	788	24,363	*
Plymouth	17,200	15,703	380,885	243,514
Total—Chrysler Motors	29,732	27,562	721,371	473,830
Ford	31,938	29,248	819,882	701,501
Lincoln and Continental	902	0	23,945	28,466
Mercury	5,412	3,101	171,484	138,881
Total—Ford Motor Company	38,252	32,349	1,015,311	868,848
Buick	6,554	6,924	238,973	322,271
Cadillac	3,342	3,349	85,032	84,376
Chevrolet	30,340	31,202	792,004	878,892
Oldsmobile	7,816	7,616	228,642	252,241
Pontiac	6,465	6,521	198,672	191,562
Total—General Motors Corp.	54,517	55,612	1,543,323	1,729,382
Packard	5	9	6,084	13,253
Studebaker	1,011	749	31,370	46,544
Total—Studebaker-Packard Corp.	1,016	758	37,454	59,797
Checker Cab	157	130	2,315	1,688
Total—Passenger Cars	126,069	118,935	3,375,281	3,194,383
* Included with Chrysler.				
TRUCK PRODUCTION				
Chevrolet	7,666	7,391	187,159	196,303
G. M. C.	1,688	1,160	35,454	51,437
Diamond T	122	109	2,512	2,549
Divco	36	40	1,809	2,179
Dodge and Fargo	1,194	1,382	41,531	45,708
Ford	7,489	6,596	185,106	160,605
F. W. D.	37	25	595	971
International	3,112	3,071	58,961	73,357
Mack	357	332	8,775	9,659
Reo	135	132	2,031	1,943
Studebaker	130	160	5,828	7,857
White	298	289	8,268	9,817
Willys	1,600	1,544	33,300	31,123
All Others	85	85	2,245	3,487
Total—Trucks	23,949	22,316	573,606	597,196
Buses	90	92	2,262	2,287
Total—Motor Vehicles	150,108	141,343	3,951,149	3,793,865

1957 TRUCK TRAILER SHIPMENTS

Type of Trailer	April	March*	Four Months
Vans			
Insulated and refrigerated	463	389	1,546
Steel	60	63	238
Aluminum	403	326	1,308
Semi-insulated	55	78	289
Steel	10	10	45
Aluminum	45	68	244
Furniture	186	185	706
Steel	150	165	637
Aluminum	36	20	69
All other closed-top	1,473	1,861	6,983
Steel	731	972	3,482
Aluminum	742	889	3,501
Open-top	302	244	1,199
Steel	135	157	643
Aluminum	167	87	556
Total—Vans	2,479	2,757	10,723
Tanks			
Petroleum	454	384	1,702
All other	199	126	532
Total—Tanks	653	510	2,234
Pole, pipe and logging			
Single axle	36	50	149
Tandem axle	67	86	245
Total	103	136	394
Platforms			
Racks, livestock and stake	355	189	646
Grain bodies	155	141	589
Flats, all types	538	624	2,464
Total—Platforms	1,048	954	3,699
Low-bed heavy haulers	359	330	1,135
Dump trailers	243	177	744
All other trailers	315	301	1,126
Total—Complete Trailers	5,200	5,165	20,055
Chassis	258	292	1,057
Total—Trailers and Chassis	5,458	5,457	21,112

*—Revised. Source—Industry Div., Bureau of the Census.

1957 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Month	6,000 lb and less	6,001-10,000 lb	10,001-14,000 lb	14,001-16,000 lb	16,001-19,500 lb	19,501-26,000 lb	26,001-33,000 lb	Over 33,000 lb	Total
January	48,186	11,843	2,399	12,478	6,398	3,560	3,360	2,893	91,117
February	45,516	13,537	3,289	13,921	4,994	3,988	3,436	3,086	91,767
March	45,873	13,616	3,469	13,035	5,117	3,985	3,502	3,106	91,703
April	46,699	16,254	3,979	19,127	7,371	4,441	3,656	3,648	105,175
May	46,425	15,600	4,701	16,497	7,624	4,442	3,406	3,615	102,312
5 Months, 1957	232,699	70,850	17,837	75,058	31,504	20,416	17,362	16,348	482,074
5 Months, 1956	202,262*	92,529*	18,433	91,949	34,589	27,892	37,252	**	504,926

*—Prior to Jan. 1957 vehicles below 10,001 G.V.W. were grouped "5,000 & less" and "5,001-10,000 lb." **—Included with 26,001-33,000 group.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	April 1957	March 1957	April 1956	Four Months 1957	Four Months 1956	Per Cent Change: April over March	Per Cent Change: April over April 1956	Per Cent Change: Four Months 1957 over 1956
1	New England	33,879	26,592	36,637	100,920	111,662	+27.40	− 7.53	− 9.62
2	Middle Atlantic	112,141	123,723	121,275	369,741	355,132	− 9.36	− 7.53	+ 4.11
3	South Atlantic	85,855	87,594	86,151	257,191	251,455	− 2.37	− .75	+ 2.28
4	East North Central	136,951	141,045	134,063	506,395	506,202	− 3.12	+ 1.93	+ .04
5	East South Central	27,818	26,490	28,586	98,478	106,204	+ 5.01	− 2.69	− 7.27
6	West North Central	52,161	51,677	47,891	178,632	172,411	+ .94	+ 8.92	+ 3.61
7	West South Central	44,816	47,516	48,288	184,309	187,198	− 5.68	− 7.19	− 1.54
8	Mountain	16,530	16,783	18,103	62,671	64,300	− 1.51	− 8.69	− 2.53
9	Pacific	58,958	71,497	63,278	239,171	234,132	−17.54	− 6.83	+ 2.15
	Total—United States	548,609	572,917	564,272	1,997,508	1,988,698	− 4.24	− 2.78	+ .44

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

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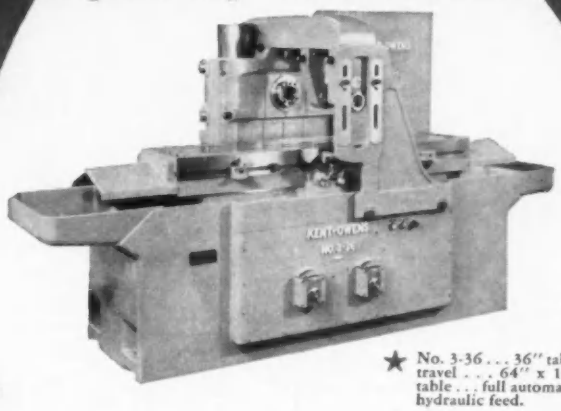
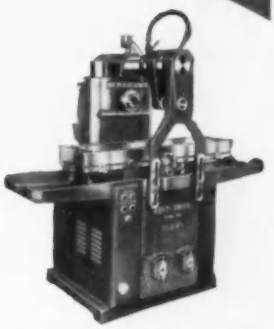
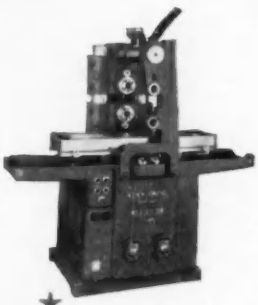


★ No. 3-36 . . . 36" table travel . . . 64" x 16" table . . . full automatic hydraulic feed.

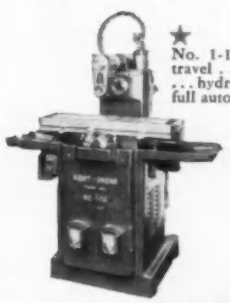


★ No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic feed.

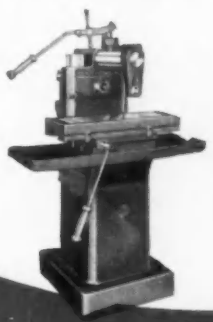


★ No. 2-20DS . . . Double Spindle for two milling operations . . . 20" table travel . . . 42" x 12" table. Hydraulic feed.

You'll turn out milling jobs with stepped up speed and accuracy with the work on Kent-Owens Machines! These extra-rugged Millers are performance-proved . . . simple . . . versatile . . . practical in every detail. Advanced features throughout! Twin-post head mounting assures balanced load. Only two gear contacts, motor to spindle, means greater cutting efficiency. Check your needs! Write today for bulletins on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.



★ No. 1-14 . . . 14" table travel . . . 32" x 9" table . . . hydraulic table feed . . . full automatic cycle.



★ No. 1-M . . . Hand feed to table and head . . . 25" x 9" table travel . . . head counter-balance is adjustable.

CALL ON

KENT-OWENS

for milling machines

KENT-OWENS REPRESENTATIVES

Total—United States	548,609	572,917	561,272	1,997,508	1,988,696	− 4.24	− 2.78	+ .44

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

PYROCERAM . . .
a New Material

CORNING Glass Works has come up with a new material that challenges some of the metals, particularly in the aircraft field. It takes heat up to 1300 F, is harder than carbon steel, lighter than aluminum, and nine times stronger than plate glass.

Corning calls the hard, fine-grained crystalline material Pyroceram. Made from glass, it can be individually formulated — over 400 different compositions have been developed to date. Properties include good mechanical strength, excellent electrical insulating at very high frequencies, high deformation temperatures, superior thermal shock resistance, and hardness.

How Pyroceram Is Made

One or more special nucleating agents are added to a batch of non-crystalline glass. The batch is melted, formed and then cooled. Subsequent heat treatments cause the nucleating agents to form billions of submicroscopic crystallites per cubic millimeter of the material. Each crystallite acts as a center of crystal growth as the heat continues. The end product is non-porous and harder than most ceramics and many metals.

Physicals

Mechanically, Pyroceram has a high ratio of strength to weight. One type has a specific gravity of 2.62 and a modulus of rupture or flexural strength of 37,000 psi. One experimental type goes up to 60,000 psi. There is very little loss of strength at temperatures up to 1300 F. Deformation temperatures range up to 2460 F. Strength is not particularly affected by surface scratches. The material is harder than flint, granite, or hardened high carbon steel, but not as hard as sapphire. It is extremely resistant to abrasion, is impermeable and unaffected by moisture or gases.

The family of materials can be produced with a variety of thermal properties. Coefficient of expansion ranges from slightly negative to 47×10^{-7}/deg C; one type has been made with a C of E of 200×10^{-7} per degree C. Low thermal expansion and high tensile strength of certain types make them extremely resistant to thermal shock. One type has a thermal shock resistance greater than dense alumina, and equal to fused silica. This type has been heated to 1650 F and plunged into water at 41 F without failure. Thermal conductivity is 0.008-0.009 cal/sec/cm/sec.

Forming Possibilities

This new material can be formed while in its glassy state into a variety of shapes and sizes by mass production techniques. Pyroceram has been blown into a number of items such as flasks, cylinders and beakers for test purposes.

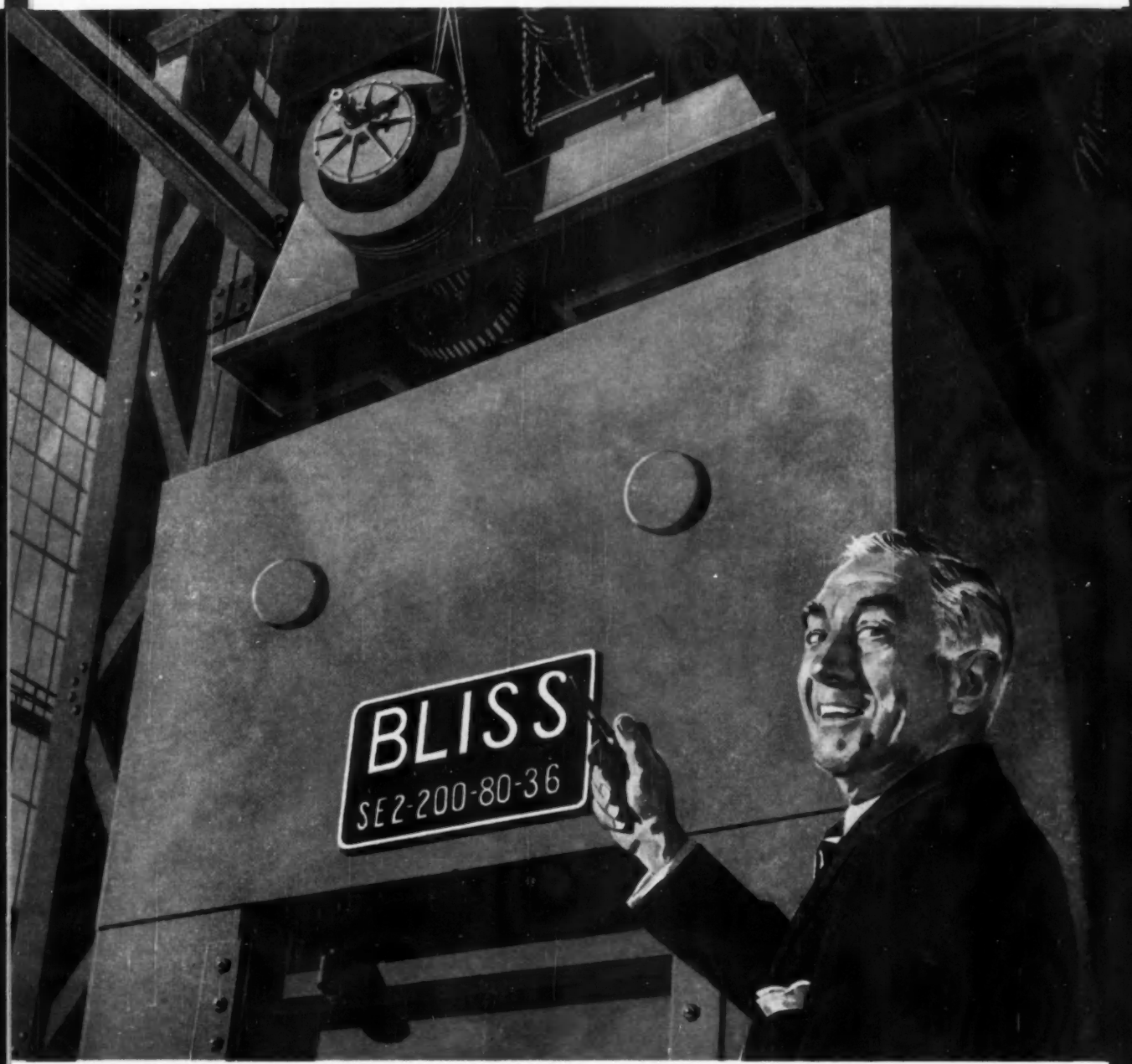
Certain types of the material have been pressed into crucibles, flat pans, high walled and low walled containers. Sheet, tubing, and rods are formed by drawing the molten glass from a melting tank. There are indications that the materials can be rolled into large sheets.

Two types of Pyroceram, which are very fluid in their glassy state, can be formed by centrifugal and investment casting methods. Conical shapes for guided missile radomes have been centrifugally cast. The cones are approximately three feet long and over one foot in diameter. Work is being carried out to cast Pyroceram by the lost-wax investment technique.

Corning foresees use of the new material for jet engine blading, aircraft skins, and other products related to the aviation field.

PROPERTIES OF PYROCERAM

	8605 (Opaque)	8606 (Opaque)	8607 (Clear)	8608 (Opaque)
Specific Gravity Room Temp. (25°C)	2.62	2.60	2.40	2.50
Water Absorption (per cent)	0.00	0.00	0.00	0.00
Porosity (gas permeability)	Gas tight	Gas tight	Gas tight	Gas tight
THERMAL				
Softening Temp. (°)	1350	1250		
Specific Heat (25°C)	0.185	0.190		0.190
Mean (25°C-400°C)	0.230	0.232		0.240
Thermal Conductivity (CGS) 25°C mean temp.	0.0100	0.0073		0.0037
Linear Coef. of Thermal Expansion x 10^7 (25° to 300°C)	14	57	−7	2 to 3
MECHANICAL				
Modulus of Elasticity (PSI x 10^{-6})	19.8	17.8		
Poisson's Ratio	—	0.24		
Tensile Strength (PSI x 10^{-3}) (For metals: Ultimate Strength)	—	—		
Modulus of Rupture (PSI x 10^{-3})	37	32		
Strength to Weight Ratio M. R. strength/spec. gr. (PSI x 10^{-3})	14.1	12.3		
Hardness:				
(1) Brinell 500 Kg	—	—		
(2) Knoop 50 gm	1100	940		
500 gm	720	570		
(3) Abrasion (sand blast)—plate glass, 1.0	27	20		



"This used to take hours...

now the whole gearcase comes off in minutes!" Quite an accomplishment for an enclosed eccentric press. Too often the advantages of the enclosed design are gained by sacrificing the accessibility of the open design. Not so with Bliss, however: Bliss engineers count practical maintenance a design "must"—any new design that comes off the boards at Bliss keeps the maintenance man in mind.

Which is one more reason why industry agrees, "Bliss is more than a name ...it's a guarantee."

BLISS
SINCE 1857

E. W. BLISS COMPANY · Canton, Ohio

100 years of making metal work for mankind

PRESSES • ROLLING MILLS • MILL ROLLS • DIE SETS • CAN MACHINERY • ORDNANCE

than flint, granite, or hardened high carbon steel, but not as hard as sapphire. It is extremely re-

(3) Abrasion (sand blast)—plate glass, 1.0 27 20

MEN *in the* NEWS

(*Continued from page* 41)

Allis Chalmers Mfg. Co.—**J. S. Morgan** is now director of domestic sales for the Industries Group.

Olin Mathieson Chemical Corp.—**Fred H. Edgar** has become sales manager of the Detroit-Cleveland Div. for Olin Aluminum, and **Forrest F. Tiffany** is now sales manager of the Cincinnati-Dallas Div.

Electric Auto-Lite Co.—**Joseph L. Rooney** has been named chief engineer of Central Battery Engineering, and **John L. Lander** has been appointed manager of basic battery research. **Samuel L. Ford, Roger L. Bennett, Raymond C. Haefner,** and **William R. Clingenpeel** have been appointed assistant chief engineers within the Battery Engineering Div. in charge of research and development functions.

Flintkote Co. — **George J. Pecaro** was elected executive vice-president.

Sharon Steel Corp. —Frank W. Knecht, Jr., was appointed vice-president of the company and general manager of the Brainard Div.

Fischer & Porter Co.—**Nathaniel Brewer** has become vice-president in charge of technology and chairman of the executive committee, and **Alexander Greenfield** is now director of research, development and engineering.

Wayne Pump Co.—**Charles H. Godschall** is now vice-president in charge of planning and production.

Yale & Towne Mfg. Co.—**J. Stuart Woolley** has been named purchasing agent for the new San Leandro, Calif., plant.

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**Harland L. Printz** has been appointed superintendent of tooling, and **Karl I. Silvey** has been named manager of the new Information Services Dept.

B. F. Goodrich Tire Co.—**Serge I. Warner** has been named manager of sales services.

Crucible Steel Co. of America—**Edward J. Martin** has become administrator of employment and training, and **Arthur E. Murphy** is now coordinator of college relations and recruitment.

Bell Automation Corp.—**Earl D. Riner** has been appointed vice-president and general manager.

Baldwin-Lima-Hamilton Corp., Electronics & Instrumentation Div.—**A. J. Yorgiadis** and **A. U. Kutsay** have been named product manager and chief engineer, and assistant chief engineer, respectively, for the new Dynamics Products Group.

Joseph T. Ryerson & Son, Inc.—**Jack D. Dowdall** was named manager of taxes, while **Donald L. Norman** has become manager of legal affairs.

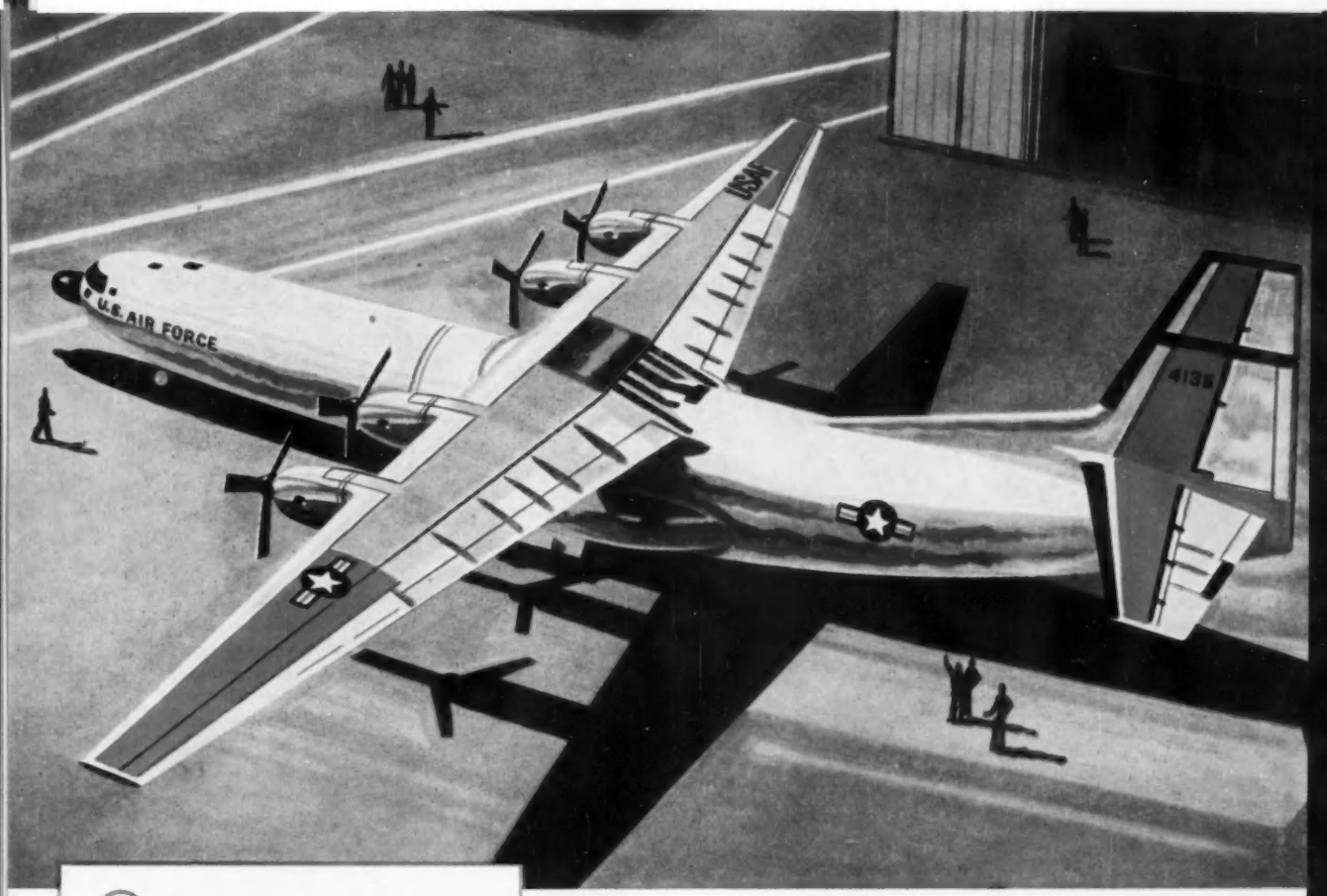
Henry Disston Div., H. K. Porter Co., Inc.—**Arthur S. Nippes** has been named vice-president and general manager.

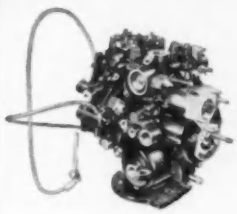
Wheelabrator Corp., Dust & Fume Div.—**Kenneth E. Blessing** was named sales manager.

Landers Corp.—**Charles M. Scholz, Jr.,** has been named general sales manager succeeding **James L. Davison,** now director of sales planning and market analysis.

(*Turn to page* 190, *please*)

PRESSES • ROLLING MILLS • MILL ROLLS • DIE SETS • CAN MACHINERY • ORDNANCE





Typical of engine control systems designed and manufactured by Holley is this R-85 unit developed for the Pratt & Whitney Aircraft T34 engine which powers the huge Douglas C-133A, above.

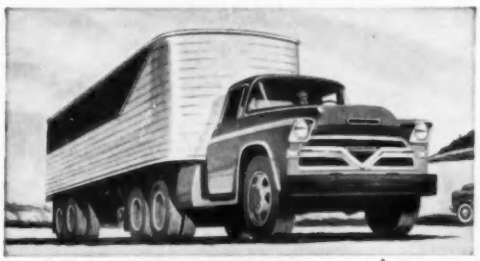
Giant new cargo carrier uses Holley engine control system

Imagine the power required to lift this plane and cargo of 137½ tons into the air. Largest transport ever produced, the huge Douglas C-133A is equipped with four Pratt & Whitney T34 turboprop engines together with Holley R-85 fuel controls.

In cooperation with engine manufacturers, Holley engineers design, develop and manufacture many aircraft engine controls vital to the air defense of the U.S. Among them: components for the J-57 engine which powers many of the new "century" series interceptors.

Additionally, Holley has built carburetors, distributors and heat regulators for more than ten million automobiles on the road today. And more than half of America's major truck manufacturers factory-equip their products with Holley engine control systems.

Wherever engine control systems are needed, Holley's half century of design, engineering and manufacturing experience can best meet your requirements.



More than half of America's truck manufacturers use Holley integrally-designed engine control systems to provide their products with maximum power at minimum operating cost.

More than ten million automobiles on the road today are equipped with carburetors, distributors and heat regulators designed by Holley to give finest engine performance.

For more than half-a-century — original equipment manufacturers for the automotive and aviation industries.

HOLLEY Carburetor Co.

I-26

11955 E. NINE MILE ROAD, VAN DYKE, MICHIGAN

and market analysis.

(*Turn to page* 190, *please*)

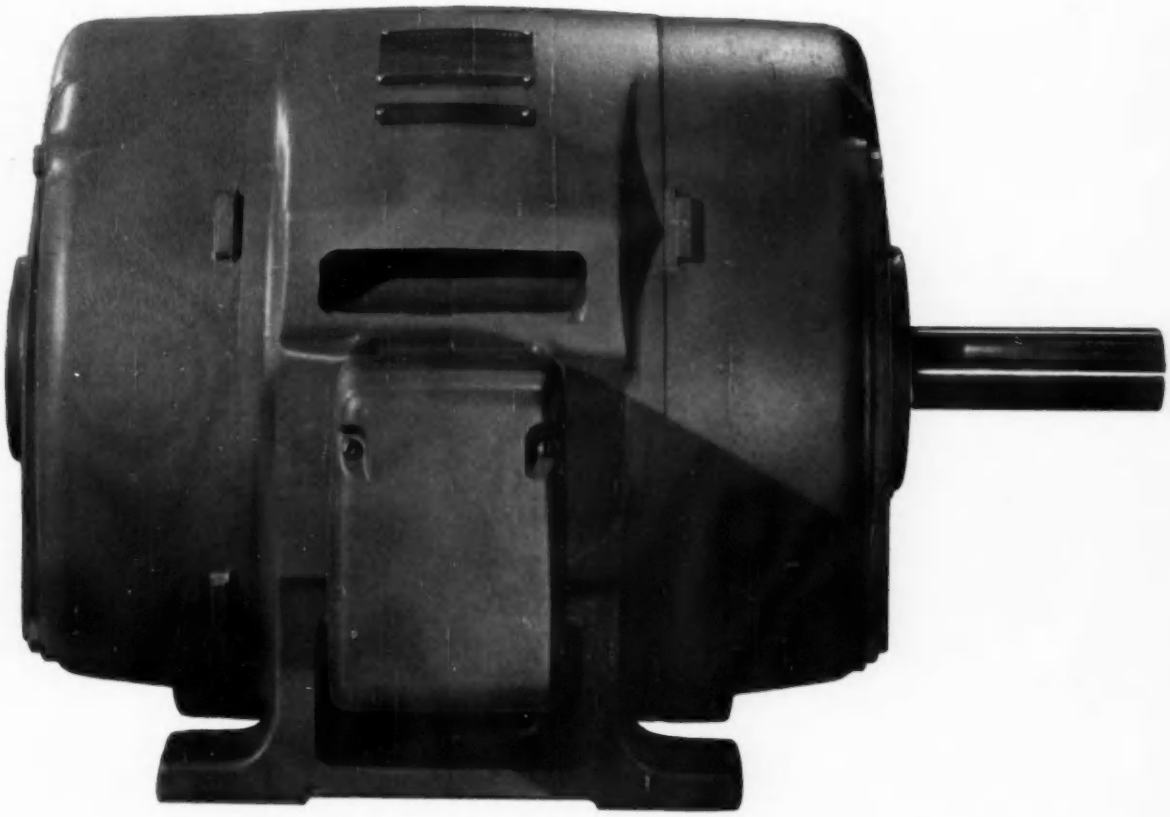
distributors and heat regulators designed by Holley to give finest engine performance.

Your first step: see other side.

Alcoa is Aluminum

NEW

FROM GENERAL ELECTRIC



TRI 55 CLAD REG. U.S. PAT. OFF. **MOTORS**

NOW UP TO 125 HP

GENERAL ELECTRIC

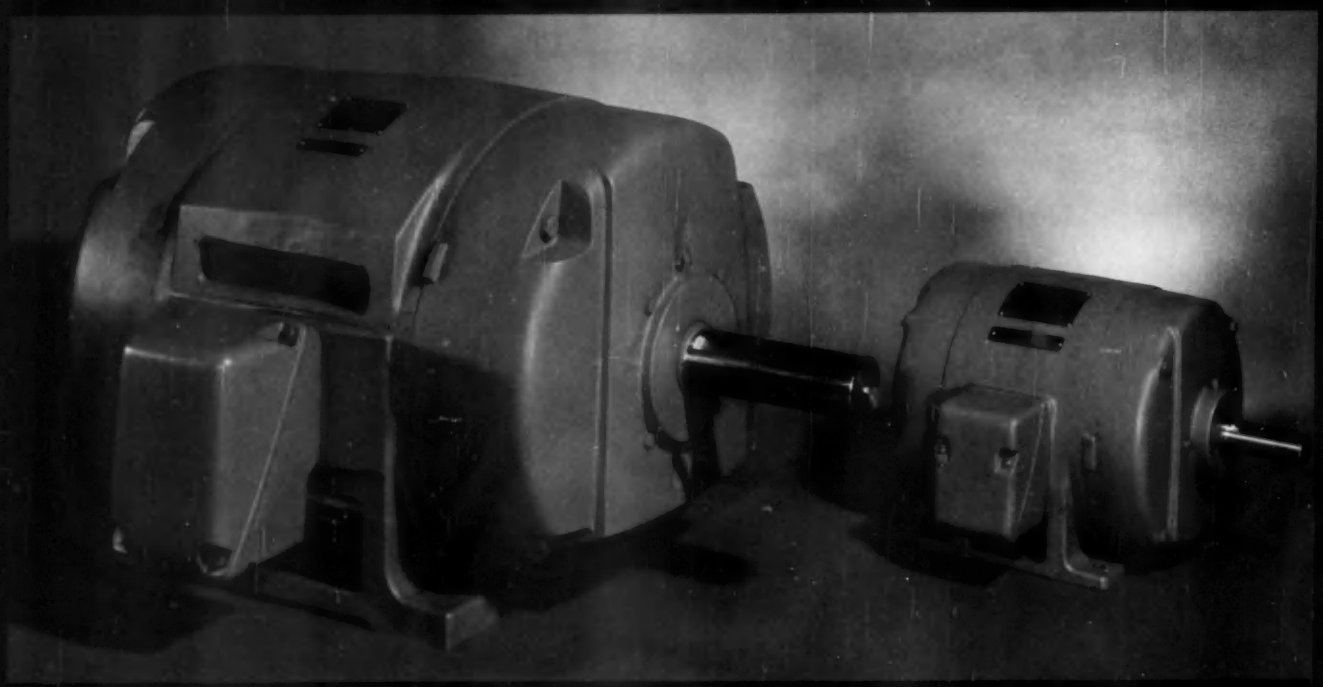
compact . . . power-packed

General Electric TRI 55 CLAD

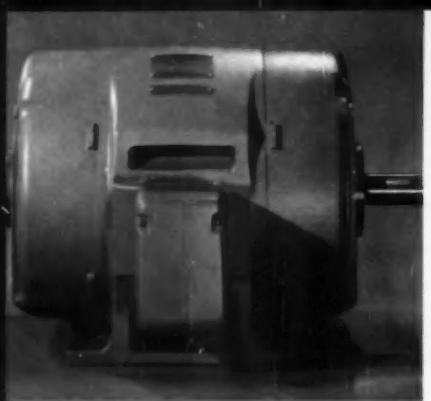
REG. U.S. PAT. OFF.

NOW UP

DRIPPROOF

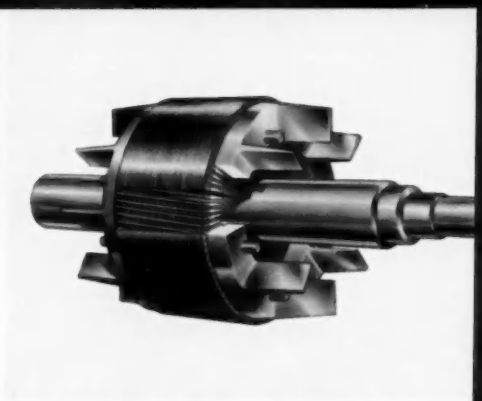


DESIGNED, BUILT AND TESTED FOR



FULLY PROTECTED by cast-iron enclosures, Tri-Clad '55' motors handle many jobs where ordinary drippproof motors cannot be applied.

MYLAR* slot insulation, Formex® wire, non-wicking Geoprene® leads and Dri-Film® silicone coating increase stator life up to 50%.



IMPROVED ROTORS are solid cast of pure aluminum for greater strength, higher conductivity. Rotor bars are insulated from core to improve motor efficiency.

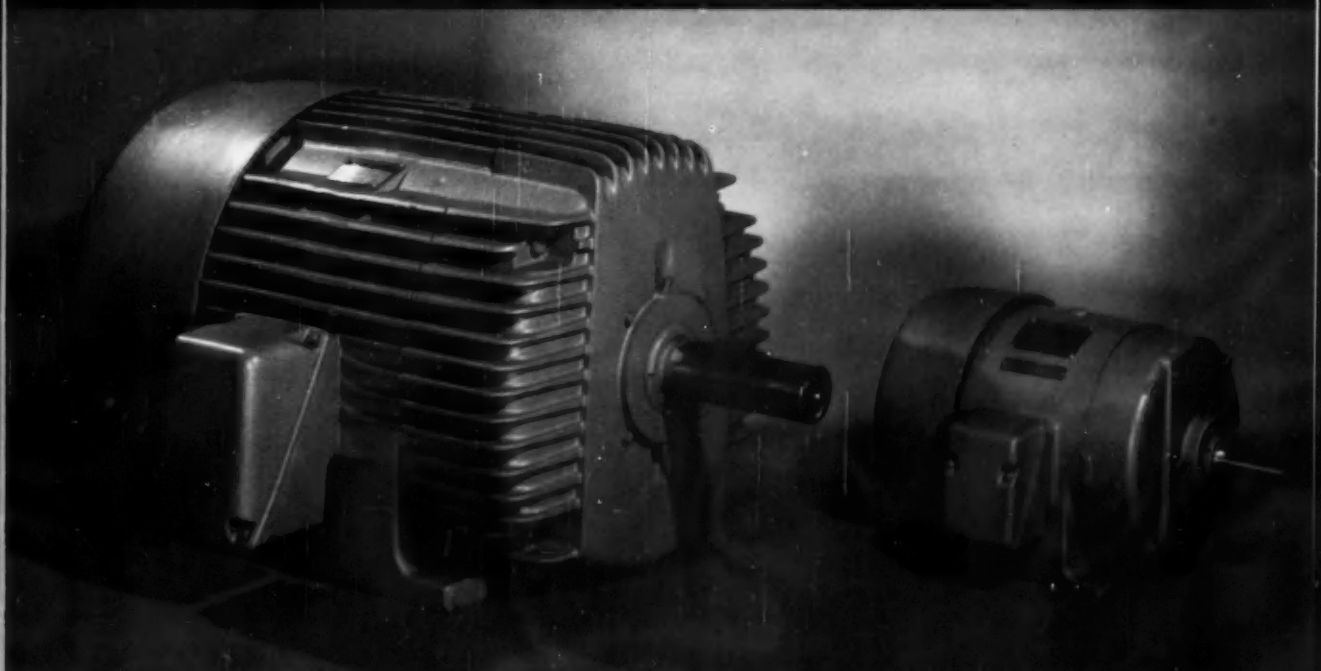
*Registered Trade-mark Dupont Co.

GENERAL ELECTRIC

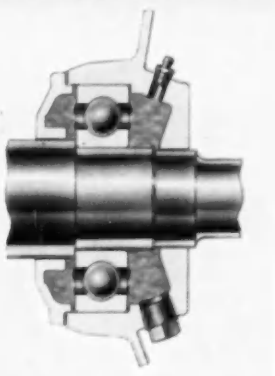
Motors in New NEMA Ratings

TO 125 HP

TOTALLY ENCLOSED

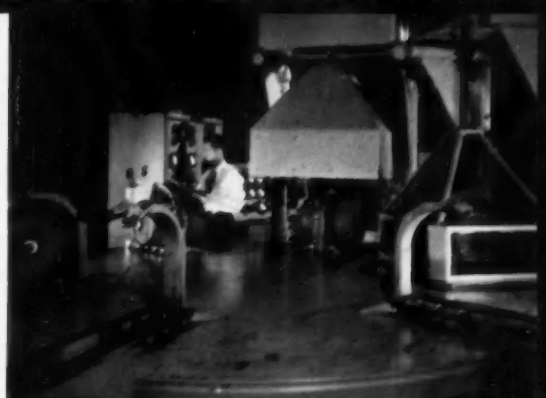


LONGER LIFE, EASIER MAINTENANCE



BEARING SYSTEM uses over-size ball bearings, synthesized grease, long, close-running seals to extend motor life.

PERMA-NUMBERED LEADS and roomy conduit box facilitate motor hook-up. Knock-off lugs speed end shield removal for motor inspection.

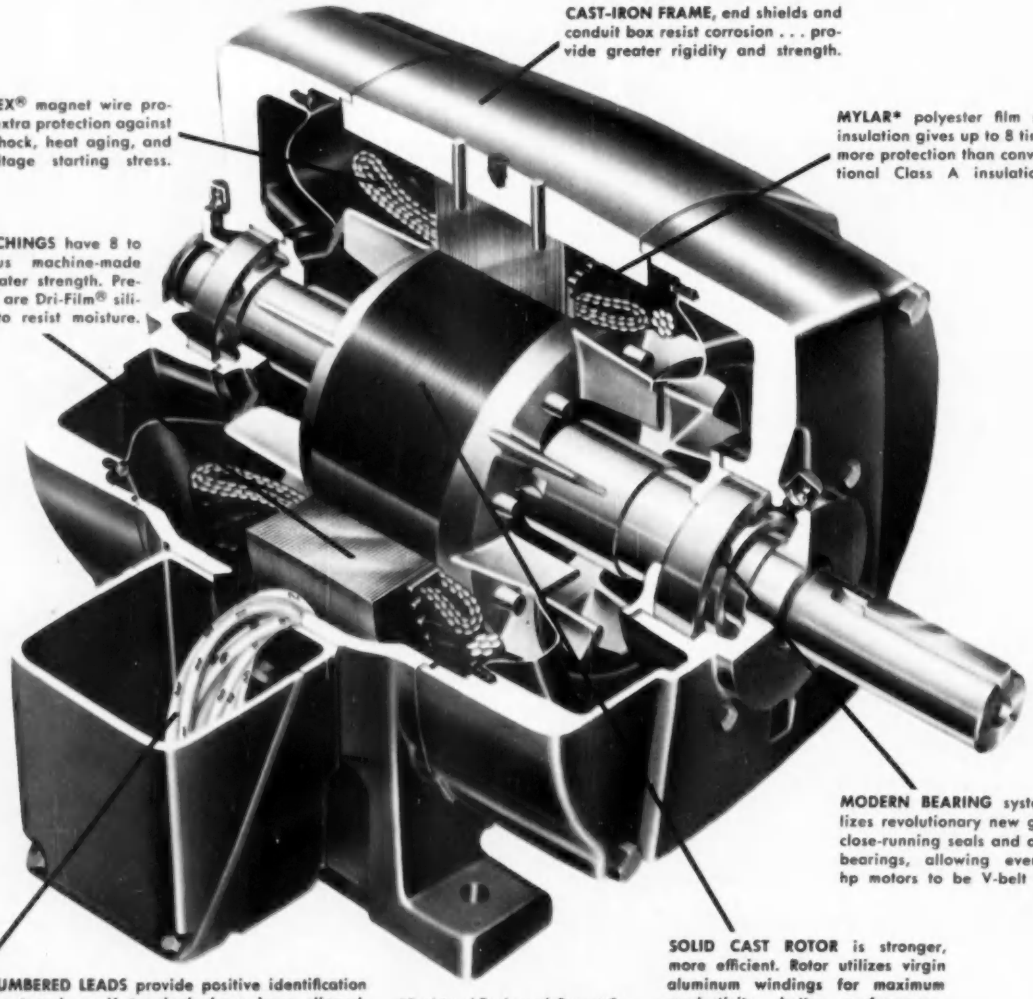


GENERAL ELECTRIC Tri-Clad '55' motors must pass a series of sound, vibration and hi-potential tests prior to shipment. Rigid tests assure uniform high-quality, and long-life performance.

TRI CLAD motors give you top performance. Here's why

compact . . . power-packed

Only G-E TRI 55 CLAD motors give you all these years-ahead benefits



CAST-IRON FRAME, end shields and conduit box resist corrosion . . . provide greater rigidity and strength.

FORMEX® magnet wire provides extra protection against heat shock, heat aging, and full-voltage starting stress.

MYLAR* polyester film slot insulation gives up to 8 times more protection than conventional Class A insulations.

STATOR PUNCHINGS have 8 to 16 continuous machine-made welds for greater strength. Pre-wound stators are Dri-Film® silicone-treated to resist moisture.

MODERN BEARING system utilizes revolutionary new greases, close-running seals and oversize bearings, allowing even 125-hp motors to be V-belt driven.

SOLID CAST ROTOR is stronger, more efficient. Rotor utilizes virgin aluminum windings for maximum conductivity, better performance.

PERMA-NUMBERED LEADS provide positive identification even when taped, or if terminals have been clipped.

*Registered Trade-mark Dupont Co.

FOR COMPLETE INFORMATION

Section 891-3
GENERAL ELECTRIC COMPANY
Schenectady 5, New York

Please send me the following publications:

☐ **FREE BULLETIN** (GEA-6602) describing the many advanced features of new Tri-Clad '55' motors up to 125-hp.

☐ **FREE SLIDE RULE** (GEN-148) to determine weight and space-saving benefits of new Tri-Clad '55' motors.

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

FOR COMPLETE DETAILS on the new line of Tri-Clad '55' motors up to 125 hp, contact your local G-E motor distributor or the motor specialist at your nearby General Electric Apparatus Sales Office. They will give you expert assistance in selecting and applying the right motor for your particular application.

For free slide rule to determine weight and space-saving benefits of the new motor, and for informative General Electric Tri-Clad '55' motor bulletin, please send attached coupon.

Progress Is Our Most Important Product

GENERAL ELECTRIC

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, etc. This list is for the period May 29 to June 25, inclusive.

AERO DESIGN & ENGINEERING CO., Bethany, Okla.
Modified L-26C aircraft—$385,262

AEROJET GENERAL CORP., Sacramento, Calif.
5 KS 4500 Mk 7 mod 1 JATO's (2390) and Igniters MK 166 Mod O (120)—$723,232
1.8 KS-7800 rocket engine—2115—$1,948,924

AIR PRODUCTS, INC., Allentown, Pa.
Acquisition of facilities for the production of SF-1—$6,629,863

AMERICAN COLEMAN CO., Littleton, Colo.
Aircraft towing tractor, type MB-4—595—$3,484,396

AXELSON MANUFACTURING CO., Div. of U. S. Industries Inc., Los Angeles, Calif.
Component parts for landing gear assy. applicable to T28 aircraft—$96,784

BAKER RAULING CO., Cleveland, Ohio
Truck lift, fork, gasoline powered, 4000 lb cap.—110—2 lots—$396,344

BEECH AIRCRAFT CORP., Wichita, Kans.
Modification of 1700 gallon tank side struts for B-47 aircraft—$117,642

BELL HELICOPTER CORP., Fort Worth, Tex.
Fatigue and qualification testing of YH-40 helicopter—$1,405,000

BENDIX AVIATION CORP., Sidney, N. Y.
Distributors, breaker & ring assy.—various—25,376

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Ind.
Carburetors & primer assys.—various—$112,352
Component parts for strut assy. F84, D, E, G, aircraft—$386,760
Miscel. aircraft wheel and brake parts—$1,110,075
Spare parts for aircraft wheels and brakes—$109,098
Carburetor assy.—1416—$238,922
Wheel assy., main 26x6.6 for F-86 except H aircraft. Brake assy., main (for 17.00-20 wheel), for C-119 and B-26 aircraft—$688,032
Arm & strut assys. for F9F-8T aircraft—various—$223,607

BENDIX AVIATION CORP., Eclipse-Pioneer Div., Teterboro, N. J.
Services, material and parts—various—$152,536

BOEING AIRPLANE CO., Seattle, Wash.
KC-135A aircraft—$47,724,799

BUDD CO., Philadelphia, Pa.
Research and development for improvement of 81mm mortars and mortar ammunition—$89,500

CATERPILLAR TRACTOR CO., Peoria, Ill.
Turbocharged Diesel engines—3—$49,870

CENTRAL FIRE TRUCK CORP., Manchester, Mo.
Truck, fire-fighting, 500 gpm, 600 gal tank—7—$76,920

CHAMPION SPARK PLUG CO., Toledo, Ohio
Spark plugs—various—$36,102

CHRYSLER CORP., Detroit, Mich.
Automotive spare parts (modification)—$420,041

CHRYSLER CORP., Newark, Del.
M48 A2 Tanks—900—$71,439,424

CHRYSLER MOTORS CORP., Washington, D. C.
Trucks—2—$12,761

CLARK EQUIPMENT CO., Buchanan, Mich.
Truck, fork lift, gasoline engine driven, 15,000 lb cap.—11—$98,304

CONTINENTAL AVIATION AND ENGINEERING CORP., Detroit, Mich.
Construct seven (7) complete power packages using AOI-628-1 engines and XT-300 transmission—$323,160
Modification of fuel controls for J69-T9 engines—$41,747
Spares—165—$26,002

CONTINENTAL MOTORS CORP., Muskegon, Mich.
0-205-1 engines for L-18 aircraft—$59,804

CURTISS-WRIGHT CORP., Caldwell, N. J.
Repair and/or modification, test, preservation, packaging, etc., propeller assemblies—$529,001

DETROIT BEVEL GEAR CO., Detroit, Mich.
Shaft assy., propeller, rear, w/universal joint assy.—6997—$79,695

DIAMOND T MOTOR CAR CO., Chicago, Ill.
Truck, tractor, 15 ton, 6x4 (Diesel)—11—$168,271

DORSEY TRAILERS, INC., Elba, Ala.
Semitrailer, van, refrigerator, 12 ton, 2 wheel—7
Semitrailer, van, 12 ton, 28 ft—15
Semitrailer, van, 20 ton, 32 ft, 4-wheel—3—$119,261
Trailer, 762 m/m rocket, 4W—38—$127,813

ELASTIC STOP NUT CORP., Union, N. Y.
Nut—4,106,400—$58,569

ELECTRIC AUTO-LITE CO., Toledo, Ohio
Battery, storage, 12-v, 45 amp—2500—$38,232

FAFNIR BEARING CO., New Britain, Conn.
Bearings—12,000—$32,040

FOOD MACHINERY AND CHEMICAL CORP., San Jose, Calif.
Modification of two T59 vehicles with commercial engines and transmissions—$55,180
Design, develop and fabricate 2 vehicle chassis of the T113 vehicle modified for missile system—$412,627
Design and development of cargo, tractor, T93 and T93E1, Suppl. 12—$171,893

FORD MOTOR CO., Ford Div., Livonia, Mich.
Truck, panel ½ ton 4x2—84—$110,228

FORD MOTOR CO., Ford Div., Washington, D. C.
Trucks—38—$37,941

(*Turn to page* 114, *please*)

CITY & STATE

More Government Contract Awards

(*Continued from page* 113)

FRUEHAUF TRAILER CO., Detroit, Mich.
Ordnance format drawings for Nike system vehicles—$503,000

GENERAL ELECTRIC CO., Small Aircraft Engine Dept., West Lynn, Mass.
Gy 1957 product improvement contract for J85 series engines—$12,213,300

GENERAL MOTORS CORP., Detroit, Mich.
Automobile—10—$14,087

GENERAL MOTORS CORP., Pontiac, Mich.
Truck tractor, 5 ton 4x2—292—$1,562,-894

GENERAL MOTORS CORP., Aeroproducts Operations, Allison Div., Dayton, Ohio
Bearings—1020 sets—$56,916

GENERAL MOTORS CORP., Allison Div., Indianapolis, Ind.
Cônduct investigation and study to establish the optimum speed, ranges, ration coverages, final drives and fue economy for XTG400, 410, 90, 350 and XT300 transmissions—$96,900
Improvement study and adaption of commercial transmission CBT5640 to military operating characteristics—$26,700
Repair, maintain and minor modification of Government-owned transmission models—$25,000
XTG-90 transmissions and spare assemblies—4 and various—$139,800
Preliminary analysis and design layout of a three speed transmission—$48,-605
Redesign of XT-300 transmission—$26,-300
Transmission, TZ200-2X, calibrate automatic shift characteristics; modify Government-furnished M-34 trucks; and install Government-furnished engines and transmissions—$43,320
J71-A-2 turbo-jet engines for F3H aircraft—$12,337,920

GENERAL MOTORS CORP., Cadillac Motor Car Div., Detroit, Mich.
Additional facilities for performance of M56 vehicle—$922,750

GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Mich.
Trucks—125—$180,985
Truck, carryall, ½ ton, 4x2—468—$790,-913
Truck, cargo, ½ ton, 4x2—3004—$3,276,-325
Truck, stake and platform, 1-1½ ton, 4x2—300—$702,472
Station wagon, 8 pass.—311—$477,312

GENERAL MOTORS CORP., Delco Products Div., Dayton, Ohio
Aircraft accessory spare parts—7 items —$77,486

GENERAL MOTORS CORP., Foreign Dist., Div., New York, N. Y.
Trucks—24—$39,060

GENERAL MOTORS CORP., GMC Truck and Coach Div., Pontiac, Mich.
Automotive spare parts—$2,082,609

GENERAL MOTORS CORP., Harrison Radiator Div., Lockport, N. Y.
Cooler assembly, transmission, oil—1 item—$40,693

GENERAL MOTORS CORP., Hyatt Bearings Div., Bristol, Conn.
Bearings—1000—$39,950

GENERAL MOTORS CORP., New Departure Div., Bristol, Conn.
Bearings—205,794—$216,923

(*Turn to page* 116, *please*)

More Government Contract Awards

(*Continued from page* 114)

B. F. GOODRICH AVIATION PRODUCTS, Div. of B. F. Goodrich Co., Akron, Ohio
Boot, deicer, stabilizer—420; boot, deicer, wing, left-hand—340; boot, deicer, wing, right-hand—390—$135,641

GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Maintenance parts for various aircraft—$96,102
Brake assys. & linings—various—$75,586
Maintenance parts for FJ-4 aircraft—various—$37,971
Tube, 9.00x20—100,000—$398,000
Miscel. aircraft wheel and brake parts—$146,164
Wheel assys.—various—$76,570

GOULD-NATIONAL BATTERIES, INC., St. Paul, Minn.
Battery, storage, 12-v—9800—$213,444

HOLLEY CARBURETOR CO., Van Dyke, Mich.
Aircraft accessory spare parts—13 items—$28,344

INTERNATIONAL HARVESTER CO., Chicago, Ill.
Crankcase, engine, for half track—137—$34,721
Continuation of resource engineering study with revised scope of work—$199,989

INTERNATIONAL HARVESTER CO., Washington, D. C.
Trucks—3—$14,481
Trucks, distributor, water, 2000 gal, 5 ton, 6x4—5
Truck, tractor, 10 ton, 6x4—47
Truck, tractor, 5 ton, 6x4—2
Truck, tank, fuel servicing, 2000 gal, 5 ton, 4x2—2—$460,883
Buses—10—$105,886

KAYDON ENGINEERING CORP., Muskegon, Mich.
Bearing, ball housing for 20mm T171 E3 weapon—325—$66,613

LOCKHEED AIR CRAFT CORP., Burbank, Calif.
Modification of F-94C mobile training units for F-84C-4, 5 & 6 aircraft—$33,346

MACK TRUCKS, INC., Washington, D. C.
Trucks, 10 ton, 6x6—$7,864,290

MARLIN - ROCKWELL CORP., Jamestown, N. Y.
Bearings—32,000—$58,880

MARMON-HERRINGTON CO., INC., Indianapolis, Ind.
Spares—1253—$48,231

MID - STATES ORNAMENTAL IRON CO., Kansas City, Mo.
Truck-Aircraft eng. trans.—51—$90,315

MONROE AUTO EQUIPMENT CO., Monroe, Mich.
Automotive spare parts—13520—$25,012

NORTH AMERICAN AVIATION, INC., Los Angeles, Calif.
Parts and equipment necessary to support mfg. and flight line operations in connection with assembly of F-86K airplanes—$189,758

OSHKOSH MOTOR TRUCK, INC., Oshkosh, Wis.
Truck, fire-fighting, 4x4—3—$45,657

PACIFIC CAR AND FOUNDRY CO., Renton, Wash.
Services and supplies in connection with carrier, cargo, amphibious, T116—$525,978
Design, development and fabrication of T-236, T-235 and T-245 vehicles—2—Suppl. 6—$497,645

PRATT & WHITNEY CO., INC., Chandler-Evans Div., West Hartford, Conn.
Carburetors—84—$234,024

REPUBLIC AVIATION CORP., Long Island, N. Y.
Miscel. CCN'S on F-84J and F-84F airplanes and conversion of F-84J—$199,404
Spare parts applicable to F-84 acft.—$53,686

SOLAR AIRCRAFT CO., San Diego, Calif.
Gas turbine generator sets, and burner assy. for KC-97 aircraft—$1,384,202

STEWART - WARNER CORP., South Wind Div., Indianapolis, Ind.
Heater assys.—125—$56,695

TIMKEN ROLLER BEARING CO., Canton, Ohio
Bearings—41,825—$32,314

UTILITY TOOL & BODY CO., INC., Clintonville, Wis.
Chassis, trailer, generator, 2½ ton, 2 wheel—224—$242,907

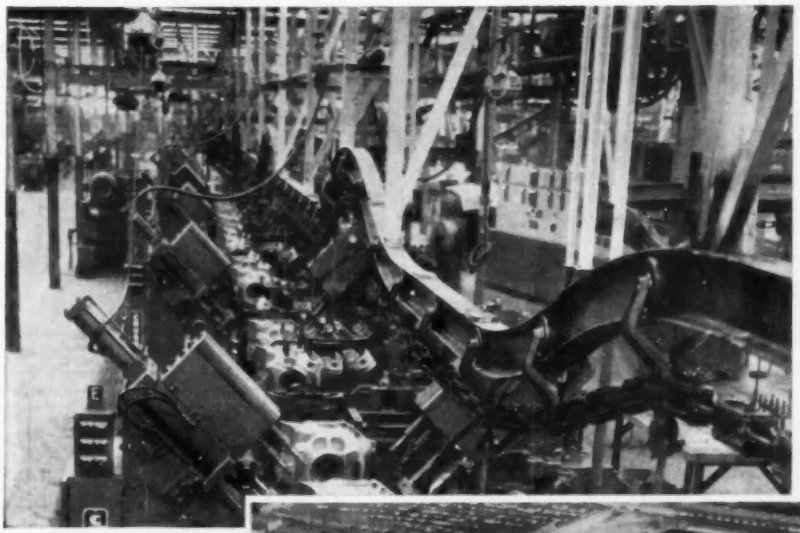
WAUKESHA MOTOR CO., Waukesha, Wis.
Auxiliary power plants—various—$404,490
Generator set, gasoline engine, portable, rubber-tired wheel-mounted—100—$155,363

WHITE MOTOR CO., White Diesel Engine Div., Springfield, Ohio
Generator set, 250 kw—2—$255,608

WILLYS MOTORS INC., Toledo, Ohio
Trucks—36—$52,906
Station wagons—6—$13,495
Jeeps—11—$13,383

YALE & TOWNE MFG. CO., Yale Materials Handling Div., Phila., Pa.
Truck, lift, fork, gasoline powered, 6000 lb cap.—$374,285

In the Spectacular PLYMOUTH ENGINE PLANT you see



VICKERS®
HYDRAULICS
Wherever You Look

Plymouth Engine Plant is 980' long and 500' wide. Indicative of its scope is crankshaft machining requiring 4500 linear feet of automation composed of 385 individual units. Plant capacity is 150 engines per hour.

(Above) View of Plymouth Engine assembly line

In the new Plymouth "Qualimatic" Engine plant you see Vickers Hydraulics on every side. Hundreds of machines in this latest and greatest example of automation are Vickers equipped.

Both builders and users of production equipment appreciate the significant advantages of Vickers Hydraulics . . . advantages that help produce better products at lower cost.

A specific need in the Engine Plant is standardization on a few basic hydraulic units to keep down parts inventories. The Vickers line makes standardization easy. Also desirable are hydraulics in units quickly demountable . . . so that by replacing units, repairs on the job are avoided and costly downtime reduced. Vickers has extensively developed demountable unit construction.

Whether automated or not, more and more plants have more and more Vickers Hydraulics. For further information, write for Catalog 5002B.

VICKERS HYDRAULICS is used on machines supplied by these Companies to Plymouth Engine Plant

American Broach & Machine Co.
Barnes Drill Company
Bilt-Rite Tool & Machine Co.
Buhr Machine Tool Company
Colonial Broach & Machine Co.
Crankshaft Machine Company
The Cross Company
Ex-Cell-O Corporation
Fitchburg Engineering Corp.
Greenlee Bros. & Company
Industrial Metal Products
The LaPointe Machine Tool Co.
Landis Tool Company
The R. K. LeBlond Machine Tool Co.
Lees-Bradner Company
Michigan Drill Head Co.
Micromatic Hone Corporation
Micro-Poise Engineering & Sales Co.
Modern Industrial Engineering Co.
The Motch & Merryweather Machinery Co.
Norton Company
A. P. Schraner Co.
The Sheffield Corporation
Snyder Tool & Engineering Co.
Sundstrand Machine Tool Co.
Jervis B. Webb Co.
The Wickes Corp.
Wilson Automation Co.

VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
MACHINERY HYDRAULICS DIVISION
ADMINISTRATIVE and ENGINEERING CENTER
Department 1428 • Detroit 32, Michigan

Application Engineering Offices: • ATLANTA • CHICAGO • CINCINNATI • CLEVELAND DETROIT • GRAND RAPIDS • HOUSTON • LOS ANGELES AREA (El Segundo) • MINNEAPOLIS NEW YORK AREA (Summit, N. J.) • PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) • PORTLAND, ORE. • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA • WASHINGTON • WORCESTER
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto
7545

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

AIRBRIEFS

(*Continued from page* 96)

single fatal accident. One airline, Hawaiian Airlines, has operated 27 consecutive years of safe operation.

The annual Awards, made by the National Safety Council of Chicago, Illinois, go only to domestic, territorial and overseas carriers that fly scheduled runs. It is of interest to note that during 1956, in domestic operations, the passenger fatality rate was only .62 fatalities per 100 million passenger miles and, it was in 1956, when one accident, a mid-air collision over Grand Canyon, accounted for 128 of the total 156 passenger and crew member fatalities.

Employment Leader

The aircraft industry continues to lead all other manufacturing industries in total employment. For the past 11 consecutive months payrolls of the manufacturers of aircraft, aircraft engines, aircraft systems and components have been higher than any other industry.

Figures reported by the Bureau of Labor Statistics at the end of March, 1957, showed 889,200 persons employed by the aircraft industry. This figure indicates an increase of 100,000 over March of last year and is 75,000 higher than the current total employment in the automobile industry. The automobile industry is the number two employer in the nation.

New World Non-Stop Flight

A new long distance non-stop flight was established on May 28, by Miss Jerrie Cobb, flying a standard Aero Commander 560-E twin engine airplane. Miss Cobb flew solo from Guatemala City to Oklahoma City.

It required 8 hours and 5 minutes to cover the 1522 miles. Miss Cobb's average speed was 190 mph.

The 560-E Aero Commander is a standard production model. It normally cruises at 210 mph with 70 per cent power at 10,000 ft. The aircraft has two 295 hp high-compression Lycoming engines. Maxi-

mum range of the aircraft at economy cruise of 55 per cent power is 1625 miles.

The old non-stop distance flight record for airplanes in the 3858 lb to 6613 lb class was 1235 miles. This old record was established by a Russian single-engine fighter plane.

Hawk Guided Missile

A new air defense weapon system carrying a modern warhead will be capable of destroying enemy aircraft flying at low altitudes. The system will complement the defense against high-altitude air attack now being provided by the Army's NIKE system. Raytheon Manufacturing Co. of Waltham, Mass., is the prime contractor for the Army Ordnance in developing and producing the Hawk weapon system. Research and development missiles are being produced by the Company at Andover, Mass. Pilot production is to start in the near future.

The Hawk missile has a length of 16 ft and a diameter of 14 in. It uses a solid-fuel propellent. Radar of unique design is highly effective in detecting and tracking the low flying aircraft which would ordinarily be in the blind zone of conventional radars.

Helicopter Exports

Exports of American built helicopters for the first quarter of 1957 were nearly double the number exported during the first quarter of 1956. According to the Aircraft Industries Association, a total of 64 American built helicopters were shipped abroad during the first three months of this year. This compares with only 33 units shipped in the same period last year. Value of the helicopters exported in the first quarter of 1957 amounted to $10,905,510.

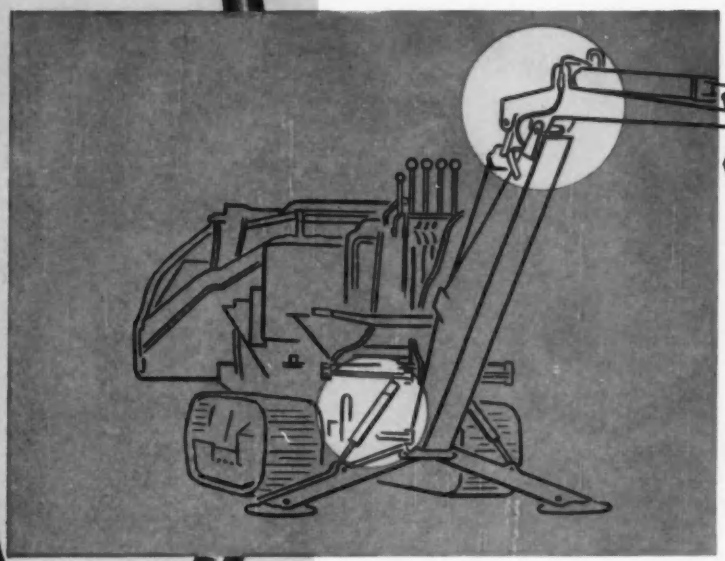
Aviation Facts & Figures

The 1957 edition of *Aviation Facts & Figures* is now available from American Aviation Publications, 1001 Vermont Avenue, N. W., Washington 5, D. C. It is an official publication of the Aircraft Industries Association of America. You

(*Turn to page* 124, *please*)

...for greater dependability...LONGER

LINEAR KEEPS THE "BITE" IN A BACK-HOE
with Roto-Mold "O" Rings



The "bite" of a back-hoe—or any of the countless other small and large earth moving machines—depends on the use of precision seals that can retain hydraulic pressure in pumps, controls and actuating cylinders under all conditions. LINEAR Precision Roto-Mold "O" Rings provide the dependability that keeps expensive equipment operating longer at peak efficiencies—around the clock.

LINEAR'S extensive experience in working with all types of elastomers enables the selection of materials that can stand up under extreme temperature variations, continuous exposure to abrasive dirt and dust, and against surge pressures which may fluctuate to as much as 50,000 psi.

The exclusive Roto-Mold process makes possible precision "O" rings—physically better—free from foreign inclusions and flash. Another plus is scheduled deliveries at maximum economy.

No matter what your sealing problem may be—call on LINEAR or one of its agents for engineering assistance—and be sure to specify LINEAR Roto-Mold "O" Rings.

"PERFECTION IN RUBBER"

LINEAR

LINEAR, Inc., STATE ROAD & LEVICK ST., PHILA. 35, PA.

OUTSTANDING TIRE

Quality Schrader Tire Valves keep rolling up the miles with every type of vehicle

VALVE PERFORMANCE:

why it's even stronger today

More people are rolling up more miles at higher speeds in more and better vehicles. The combined experience of Automotive, Tire and Tire Valve Industries has made this possible. Schrader concentrates on resolving all this experience into the design and production of the most practical tire valves. So successful is this performance that the world can and does take tire valve dependability for granted, no matter where the vehicle goes. You can count on quality Schrader Tire Valves to match the performance of your vehicles.

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Division of Scovill Manufacturing Co., Inc.

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

AIRBRIEFS

(Continued from page 120)

will find it jammed full of facts and figures and a handy reference for the latest historical and current information about U. S. aircraft, engines, components, production, facilities, military aviation, guided missiles, research and development, manpower, finances, general utility aviation, helicopters, airlines and transportation and a wealth of other information. Cost is $1.00 a copy.

Air Force Rocket Pilot Wins Award

Lieutenant Colonel Frank K. Everest, Jr., first pilot to fly the Bell X-2 rocket-driven research aircraft, received the Institute of Aeronautical Sciences Chanute Award. Presentation of the Award, including a certificate and honorarium, was made at the IAS National Summer Meeting banquet in Los Angeles on June 19.

Colonel Everest is being recognized for "his outstanding contributions to the development of rocket-powered flight test techniques." He completed his eighth and final rocket flight on July 23, 1956.

Technical Conferences On Jet Flight Operations

The future operational problems of jet powered aircraft will be the principal theme of the tenth annual Technical Conference of the International Air Transport Association. Meetings will be held at the Golden Gate Hotel, Miami Beach, Fla., from November 18 to 29. Engineers and specialists in all phases of operations of IATA's 76 members airlines, as well as representatives of government agencies, research establishments, manufacturers and national organizations of many countries are expected to participate in the forum.

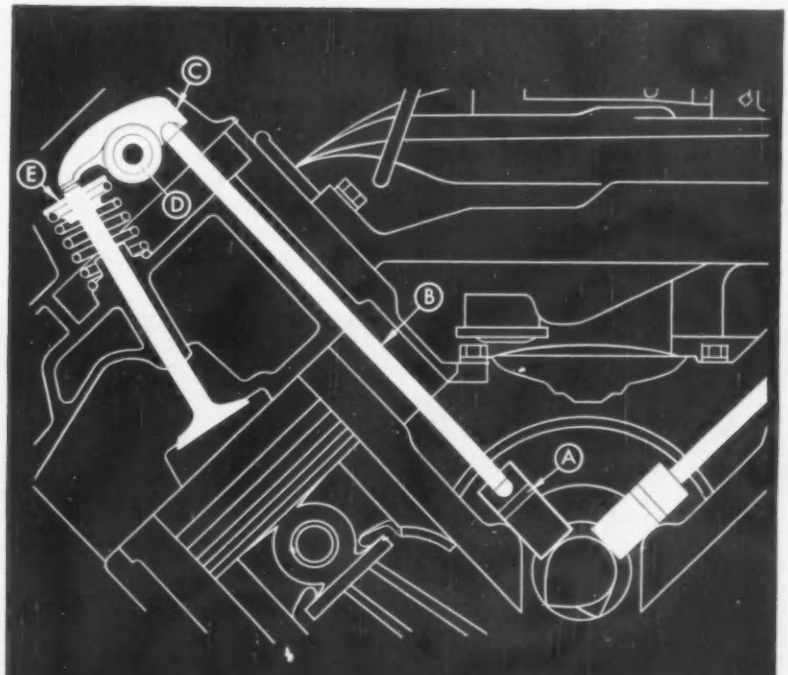
Most Modern Airline Maintenance Base

In Kansas City, Mo., Trans World Airlines has completed its new $25 million overhaul base, one of the finest and most modern in the aviation industry. The base is comprised of a power plant overhaul building (350 x 390 ft), engine test cells (140 by 70 ft) and an airframe overhaul building (1000 by 420 ft).

The facilities are located in Platte County, 14 miles northwest of downtown Kansas City, at Kansas City's Mid-Continent International Airport.

The power plant overhaul building is currently in use overhauling piston engines. Planning is already started for constructing and equipping a facility of comparable size to overhaul jet engines. This work will start in early 1958 in preparation for jet transports. We had an opportunity to visit this new modern overhaul base last month. We were particularly impressed with the new engine test cells and the lack of noise associated therewith. Instead of using propellers to load engines during test after

For all engines - - -



Chicago valve train parts in a typical V-8 automotive engine: (A) Hydraulic tappet, (B) push rod, (C) rocker arm, (D) rocker shaft, (E) valve spring retainer.

Passenger cars

Trucks

Tractors

Diesels

Aircraft

Everything you need in valve gear

from CHICAGO

Here at Chicago you'll find a single source for everything you need in valve gear. These specialized facilities are solving problems and saving money for leading engine manufacturers . . . and can do the same for you.

Design and Engineering—at Chicago you'll find valve gear engineering experience in depth . . . men who understand your problems and will work with your engineering staff in designing cam shafts and complete valve gear assemblies for any type of engine.

Manufacturing—Chicago is a leading manufacturer of valve train parts. Our complete line includes precision-made hydraulic and mechanical tappets; push rods in both lightweight tubular and solid styles; valve adjusting screws including new self-locking screws that cut assembly costs; valve spring retainers; rocker arms and rocker shafts.

Testing—we have complete laboratory and engine testing facilities.

For the full story of how we can serve you, write our Tappet Division.

THE CHICAGO SCREW COMPANY

DIVISION OF STANDARD SCREW COMPANY • ESTABLISHED 1872

2801 WASHINGTON BOULEVARD, BELLWOOD, ILLINOIS

overhaul, dynamometers are used. Use of the dynamometers not only reduces the noise and permits adjustments to be made in the test cell without shutting down the engine, but also provides a useful by-product. The by-product is steam which is piped into the power plant overhaul building to provide power for operating a portion of the heating and air conditioning units.

We were informed the City of Kansas City provided the initial capital outlay for TWA's overhaul base. TWA rents the building and land from the City on a 30-year lease basis. At the end of this time TWA will own the property and buildings.

Sonic Booms

According to Senator Barry M. Goldwater of Arizona, writing in *Planes*, official publication of the Aircraft Industries Association, "sonic booms are among the most widely misunderstood phenomena of high speed flight." Senator Goldwater reports upon a recent study of the sonic boom conducted at the Wright Air Development Center. He states this study has conclusively proved there are quite a few things in the way of damage a sonic boom cannot accomplish. For example, the sonic boom (a) cannot crack foundation walls or pavement; (b) cannot crack plaster walls installed according to most building codes; (c) cannot cause roofs to buckle or crack; (b) cannot do any structural damage, but under some circumstances can damage glass panes and improperly installed doors.

In a recent demonstration the Air Force directed sonic booms at a large plate of glass held in a frame. Five successive sonic booms failed to shatter the glass. Only when the glass was loosened in its frame did the boom cause it to shatter.

Canada's Expanding Exports in the Aircraft Industry

(*Continued from page* 50)

aircraft engines. At Montreal Rolls Royce of Canada and Canadian Pratt & Whitney have recently completed some production programs, and are mainly engaged now in overhauling jet and piston engines. Rolls Royce is preparing to service various turbojet and turboprop engines to be used on new aircraft now being built in the United States, including the Fokker Fairchild Friendship, and Douglas and Boeing jet commercial transports. These aircraft, especially

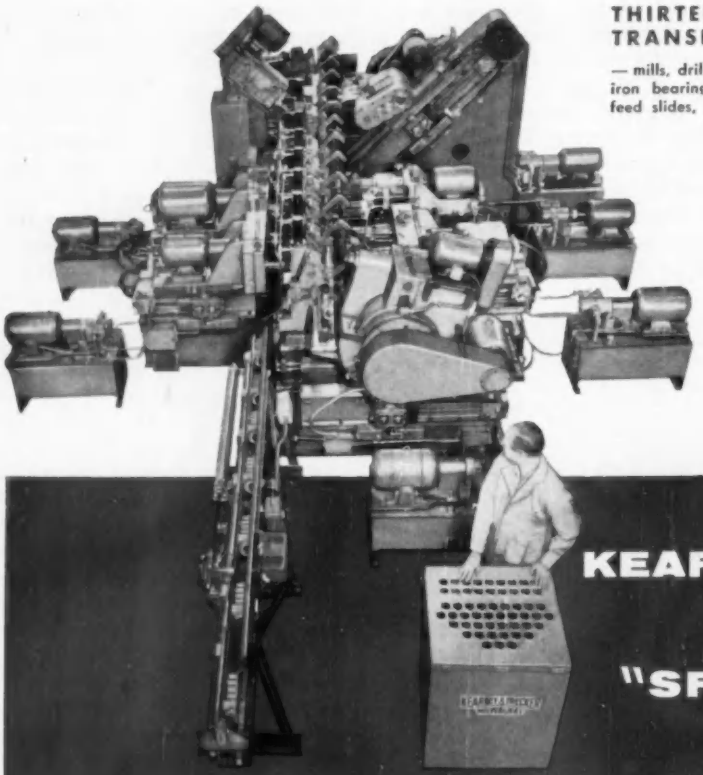
those ordered by Canadian airlines, will use the British Rolls Royce engines. The plant is also servicing the Rolls Royce engines on Viscount turboprop aircraft in service in North America, and the Royal Canadian Navy's Westinghouse J-34 jet engines used on Banshee fighters.

Canadian Pratt & Whitney at Montreal is continuing the manufacture of certain piston engines, propellers, and spare parts which are no longer in production at the U. S. parent plant. These engines and parts are for sale throughout the world from the Canadian facility.

At Toronto another British Hawker-Siddeley subsidiary, Orenda Engines Limited, is building the Orenda engine for the F-86 Sabre and the CF-100 fighters for Canadian and export purposes. It is also working on the new PS13 Iroquois jet engine which will have a thrust of more than 20,000 lb. This engine is to be test flown this year, and the United States Air Force has loaned Canada a B-47 jet bomber to make the actual flight tests. The Iroquois engine is being studied by U. S. military procurement authorities with the intention of using it on U. S. military aircraft. This is one reason the B-47 has been loaned to Canada. The Iroquois will be used as a seventh engine on this aircraft, the test engine being mounted near the rear of the plane. The Iroquois is designed primarily for the supersonic CF-105 being built by Avro Aircraft, a sister company. It is expected to be the most powerful jet engine in the western world.

While these companies which have been named are the major companies in the Canadian aircraft industry, there are a host of others supplying parts and servicing aircraft and engines. Some of these are subsidiaries of United States companies, others of British organizations. Most have plants at Montreal and Toronto, some in western Canada and on the Atlantic coast. They include a subsidiary group of the British Bristol Aeroplane Co., a subsidiary of the British Fairey Aviation Co., and some wholly-owned Canadian companies as Fleet Manufacturing, Fort Erie, Ont., which makes subassemblies and small aircraft, and Noorduyn Norseman Aircraft, Montreal, which makes spare parts for a prewar Canadian single-engined freighter in use in many countries.

Canada's aircraft manufacturing industry is one of the largest industries in Canada today, with total production last year of about $350 million. Although new military aircraft are on the schedule, there has been a stretch-out in production of current aircraft and a drop in appropriations for new military planes in the current fiscal year. This will again be stepped up as new aircraft go into large production and sales will increase as export orders for current military aircraft continue.



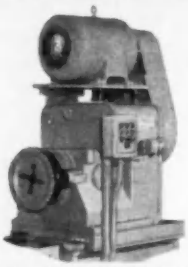
THIRTEEN STATION AUTOMATIC TRANSFER MACHINE

— mills, drills, reams, spotfaces, taps and saws apart cast iron bearing cap blocks. Machine includes 5 standard feed slides, 9 standard production units.

Because major components are standardized

KEARNEY & TRECKER TAKES THE "SPECIAL COSTS" OUT OF PRODUCTION MACHINE TOOLS

STANDARD ROTARY INDEX TABLE available in 4 different table diameters, any practical number of indexes.



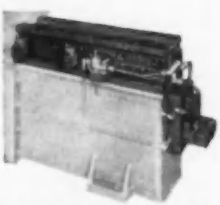
STANDARD MILLING HEAD UNIT 4 sizes. Single spindle . . . various horsepower and speed ranges . . . single or double reduction drive . . . automatic quill retraction. Any size can be modified for boring.

Here's a sound, proven *economical* approach to your production machine tool problems . . . Kearney & Trecker production machine tools featuring standardized components.

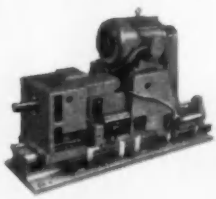
You get IMPORTANT SAVINGS—benefit directly three ways: (1) lower initial cost; (2) less lead time needed and (3) proven standard units mean efficiency *plus* simplified machine maintenance.

Ask the Kearney & Trecker man—he'll show you more examples of standardized machine components in production machine tools — the keys to capturing more profits from production!

Kearney & Trecker Corp.
6774 W. National Avenue, Milwaukee 14, Wis.

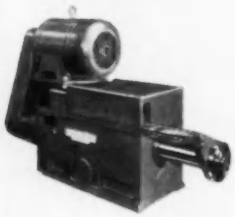


STANDARD FEED SLIDE UNIT provides hydraulic feed for milling, boring or drilling heads. Available in 4 sizes and in various length cylinder strokes.



STANDARD WAY TYPE DRILL UNIT for drilling, boring, reaming, counter-boring and chamfering. Single and multiple spindle arrangements, single or double feed rates.

ASK FOR FREE KEARNEY & TRECKER Production Machine Tools Bulletin SMD-57. It provides full standard component details — and their application to production machine tools.



STANDARD QUILL FEED UNIT for drilling, boring, reaming, spotfacing, counter-boring and chamfering. Single or multiple spindle arrangements — single or double feed rates.

KEARNEY & TRECKER MILWAUKEE

Designers and Builders of Precision and Production Machine Tools Since 1898

BUSINESS PULSE

(*Continued from page* 98)

June 17. Business loans of the leading New York City banks jumped by $685 million in the two weeks ended June 19, exceeding the rise of $522 million recorded in the corresponding period last year. Significantly, the Federal Reserve made no effort to supply reserves directly to the banking system, evidently feeling that normal needs would be amply met, temporarily at least, by the usual midmonth expansion in float.

The Treasury felt the effects of the tighter money conditions in the course of its weekly borrowings in the bill market. The average rate for regular bills rose to 3.374 per cent early in the month and then to 3.404 per cent two weeks later, both issues successively establishing new 24-year peaks for such paper. In the following week the average rate did fall to 3.231 per cent, but this was still considerably above the Federal Reserve's rediscount rate. There was talk throughout the period of a possible increase in the rediscount rate, but the Federal Reserve made no move in this direction, possibly not wanting to risk the chance of further depressing the market just prior to a Treasury financing; on June 20 the Treasury made an offering of 264-day tax anticipation bills due next March to raise $3 billion of new money to cover its seasonal needs early in the fiscal year which began July 1.

Money was also at a premium in the long-term market during June, and investors accordingly demanded and received higher yields for the use of their funds. To attract buyers, some corporations not only offered more generous rates but also "sweetened" the terms of the financing by giving the investor protection against the possibility of an early refunding at a long rate. Some $70 million of debentures of the Southern Bell Telephone Co., an issue of the highest quality rating and with a 5-year noncallable feature, was distributed at a yield of 4.85 per cent, while some bonds of lesser quality were reoffered at

(*Turn to page* 132, *please*)

feed rates.

Super Strength is a Must!

Ask Dana engineers to help meet your particular power transmission requirements. Dana has the clutch experience and the ability to do the job... the result of over 50 years of development in power transmission.

DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Powr-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings

AVIATION: Universal Joints, Propeller Shafts, Axles, Forgings, Gears, Stampings

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Rail Car Drives, Pressed Steel Parts, Traction Motor Drives

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings

MARINE. Universal Joints, Propeller Shafts, Gear Boxes

Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

Spicer Clutch Driven Disc Types to Meet Every Need

Damper Type | Riveted Facing Type | Bonded Facing Type | Ceramic Facing Type

DANA Spicer

(*Continued from page* 129)

rates as high as 6 per cent.

Long-term Government issues were very weak, having been made vulnerable to selling by holders seeking to take advantage of the higher yields available in the corporate bond market. All Treasury issues dropped to record lows, and the 3s of 1995 fell below 87 to yield about 3.65 per cent to maturity.

New Defense Facilities

ADDITIONAL Certificates of Necessity below authorize accelerated tax amortization of new or expanded facilities for manufacture of automotive and aviation defense goods. These were issued by the Office of Defense Mobilization, covering the period May 16 through June 26. Dollar values shown are face amounts of the certificates. Figures in parentheses are the percentages of these private-capital investment amounts allowed for tax write-off over five-year periods.

AIRCRAFT PRODUCTS CO., Bridgeport, Pa.
Military aircraft parts—$40,925 (70)

ALUMINUM CO. OF AMERICA, Vernon, Calif.
Aluminum extrusion facilities for military aircraft—$4,323,000 (65)

AMERICAN BRAKE SHOE CO., Chicago Heights, Ill.
Steel castings—$3,350,900 (60)

AMERICAN BRAKE SHOE CO., Leroy, N. Y.
Steel castings—$6,620,655 (65)

AMERICAN BRAKE SHOE CO., New Castle, Del.
Steel castings—$688,000 (60)

ATLANTIC STEEL CASTINGS CO., Chester, Pa.
Steel castings—$358,000 (65)

BENDIX AVIATION CORP., North Hollywood, Calif.
Military aircraft and missile components —$154,105 (65)

BIRDSBORO STEEL FOUNDRY & MACHINE CO., Birdsboro, Pa.
Steel castings—$1,315,550 (65)

BOEING AIRPLANE CO., Seattle, Wash.
Military aircraft—$1,548,838 (65)

CARCO INDUSTRIES, INC., Philadelphia, Pa.
Components for military tanks and missiles—$88,000 (55)

CONSOLIDATED FOUNDRIES & MFG. CORP., Chicago, Ill.
Steel castings—$139,000 (65)

(*Turn to page* 134, *please*)

NEW GOLDEN BONDERITE

How its golden color can mean better products, greater profits for aluminum fabricators

The golden coating achieved on aluminum by new Golden Bonderite is the key to a whole new concept in control, economy and efficiency.

No longer need you worry along with variations in coating weights and solution analyses that go up and down from hour to hour or day to day. The color of the metal as it emerges from the Bonderite machine is a visual check on solution effectiveness and coating quality. It looks the same—and it is the same—24 hours a day, seven days a week.

Parker "Reactifier" and How It Works

In ordinary surface treatment solutions of this kind, a build-up of impurities occurs as work is processed. These impurities affect the efficiency of the treatment in inverse ratio until finally the solution is beyond redeeming. The tank has to be dumped and a fresh bath made up.

This costly, wasteful procedure is ended when you use Golden Bonderite in conjunction with the sensational Parker "Reactifier" column, an exclusive apparatus that polices the solution constantly, removing the harmful elements and allowing you to use the solution indefinitely, without ever having to discard it.

Better Products, Better Profit

You use a surface treatment for your aluminum production to improve paint adhesion and corrosion resistance, to reduce rejects in the finishing department and to assure customer satisfaction. Uneven efficiency in surface treatment usually means loss of paint adhesion, production rejects and the danger of costly field service and replacements.

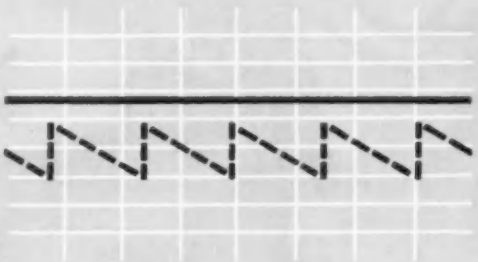
Golden Bonderite's uniform efficiency, so easily checked by color, will save you money.

1 It provides a uniform, effective paint base.

2 It allows you to schedule and maintain high production levels.

3 It permits operation at uniform low chemical concentrations.

4 It eliminates the need for dumping and rebuilding treatment solution.



Straight-as-a-string solution analysis

The saw-tooth line above is entirely too familiar to operators of conventional aluminum treatments. Efficiency sags as metal is treated, recovers as chemical is added, quickly sags again in use. Quality is uneven and uncertain.

New Golden Bonderite and the amazing new "Reactifier", developed by Parker, bring "straight-as-a-string" efficiency. No variation in quality even if you operate 24 hours a day, seven days a week. Solution analysis remains constant, free of impurities that reduce efficiency and quality.

Simple To Use

New Golden Bonderite may be applied by spray or immersion. Treatment time can be varied to suit production speeds and equipment. Golden Bonderite comes to you in concentrated liquid form, easy to handle and use.

Let us show you actual samples and test data on Golden Bonderite for aluminum. Call or write today!

NOTE: *A companion product to Golden Bonderite produces an appealing scratch-resistant green coating on aluminum. It's a lovely color without further finishing. A natural for architectural products.*

Since 1914—leader in the field

PARKER RUST PROOF COMPANY
2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

*Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.

New Defense Facilities

(*Continued from page* 132)

CONSOLIDATED FOUNDRIES & MFG. CO., Muskegon & Detroit, Mich.
Steel castings—$914,637 (65)

DODGE STEEL CO., Philadelphia, Pa.
Steel castings—$400,000 (65)

DOUGLAS AIRCRAFT CO., INC., El Segundo, Calif.
Military aircraft—$152,438 (65)

EX-CELL-O CORP., Elwood, Ind.
Military jet engine components—$75,706 (65)

GENERAL ELCETRIC CO., Evandale, Ohio
Military aircraft engines—$3,909,950 (80)

GENERAL ELECTRIC CO., Schenectady, N. Y.
Steel castings—$865,103 (65)

GENERAL LABORATORY ASSOCIATES, Norwich, N. Y.
Military aircraft parts—$89,000 (45)

GENERAL STEEL CASTINGS CORP., Avonmore, Pa.
Steel castings—$725,000 (65)

GENERAL STEEL CASTINGS CORP., Granite City, Ill.
Steel castings—$885,000 (65)

GRIFFIN WHEEL CO., Kansas City, Mo.
Steel castings—$4,775,000 (65)

F. C. HUYCK & SONS, Waldorf Instrument Co. Div., Huntington Station, N. Y.
Military aircraft parts—$270,043 (65)

KAMAN AIRCRAFT CORP., Bloomfield, Conn.
Research & development—$320,000 (65)

KELSEY-HAYES CO., Steel Products Engr. Div., Springfield, Ohio
Electronic equipment for military use—$975,000 (40)

LFM MANUFACTURING CO., INC., Atchinson, Kans.
Steel castings—$1,050,500 (65)

GLENN L. MARTIN CO., Baltimore, Md.
Military aircraft—$753,152 (65)

NUTMEG CRUCIBLE STEEL CO., Branford, Conn.
Steel castings—$202, 949 (65)

J. C. PEACOCK, INC., Los Angeles, Calif.
Military aircraft components—$318,831 (60)

RYAN AERONAUTICAL CO., Inglewood, Calif.
Military aircraft components—$81,325 (65)

RYAN AERONAUTICAL CO., San Diego, Calif.
Military jet engine parts—$67,671 (65)
Military aircraft engine parts—$244,651 (65)
Military aircraft and parts—$270,000 (60)

SUNDSTRAND MACHINE TOOL CO., Denver, Colo.
Military aircraft components—$485,380 (50)

UNITED AIRCRAFT CORP., Pratt & Whitney Aircraft Div., E. Hartford, Conn.
Jet engines for military aircraft—$4,700,000 (75)

VULCAN STEEL FOUNDRY CO., Alameda Co., Calif.
Steel castings—$500,000 (65)

BOOKS . . .

THE DYNAMICS OF CAPITALISM, *by Julius T. Wendzel, published by Harper & Brothers, 49 East 33 St., New York 16, N. Y. Price $3.50.* The author of this provocative book believes that changes in attitudes and policy are necessary if the American economic system is to continue its present rate of growth. He maintains that the strength of the American system of democratic capitalism stems largely from the unique relationship between the owners of capital and imaginative businessmen. This partnership results in a financial system which, when it is working smoothly, gives enterprises access to far more capital than they could personally own. In times of economic stress, the author says, new enterprises find it difficult to obtain necessary capital on reasonable terms. His suggested changes in financial policies as they relate to private and public credit are worthy of the attention of anyone interested in conserving the best features of our economy.

BETTER SUSPENSION...

...for that NEW BABY of yours!

Your next model, now in the planning stages, will be by far the best you've ever built. Naturally, you'll do *everything* to surpass the best you've ever produced before.

But how about suspension? New advances in the design and engineering of *steel springs* can accomplish what seemed impossible a year or two ago. Better metals. Controlled tempering. Scientific methods. For load balance, controlled sidesway and rebound, positive alignment and structural strength, TODAY'S springs by BURTON can work wonders.

Consult our engineering staff . . . *early!*

"Vital Support to the Automotive Industry"

BURTON SPRINGS

FOR MOTOR CARS • TRUCKS • BUSES • TRACTORS • TRAILERS • OFF HIGHWAY EQUIPMENT

BURTON AUTO SPRING CORPORATION . . . WESTERN AVENUE AT 48th STREET
CHICAGO 32, ILLINOIS

SHORTIES

Liquefied petroleum gas as a motor fuel increased 30 per cent last year to 850 million gal. Biggest users are trucks, buses, tractors, and irrigation, and drilling engines.

•

Petroleum makes up 55 per cent of all the freight moving on the oceans of the world.

•

Floor space required for building one aircraft company's new jet airliners is equivalent to 18 football fields — approximately one million sq. ft.

•

The electrical power and control system for a jet airliner weighs only 400 lb—yet produces enough power to supply the electrical needs of 160 homes.

•

Only about 6000 miles of this country's planned 41,000-mile interstate highway system will be inside cities, but they will consume over 50 per cent of the funds available and will cause the severest planning headaches.

•

Every 10 minutes, drivers of vehicles roll up 12 million miles of travel in this country, a large part of that in urban areas. They would travel much further than that were it not for congestion within the cities.

•

Total expenditures for research and development reached a new high of $8.8 billion in the U. S. in 1956.

•

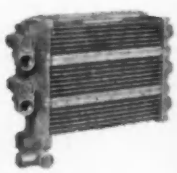
By 1960, the annual consumption of new rubber in the U. S. will exceed 1.6 million long tons a year.

•

There are more than 10.75 million trucks rolling on the streets and highways of the U. S.—nearly half of the world total.

TROPIC HEAT

OR ARCTIC COLD



Harrison Heat-Exchangers Keep Temperatures Level!

Harrison goes to any extreme to keep temperatures on the beam . . . to keep temperatures normal under all types of operating conditions! These top-quality heat-exchangers are busy everywhere —on land, on sea, and in the air . . . guarding critical engine temperatures and providing safe, sure performance. They're lightweight and compact, too—designed to save you space and money. That's why Harrison is a leader in its field—that's why so many manufacturers rely on Harrison *exclusively* for dependable, economical heat-transfer equipment. If *you* have a cooling problem, look to Harrison for the answer.

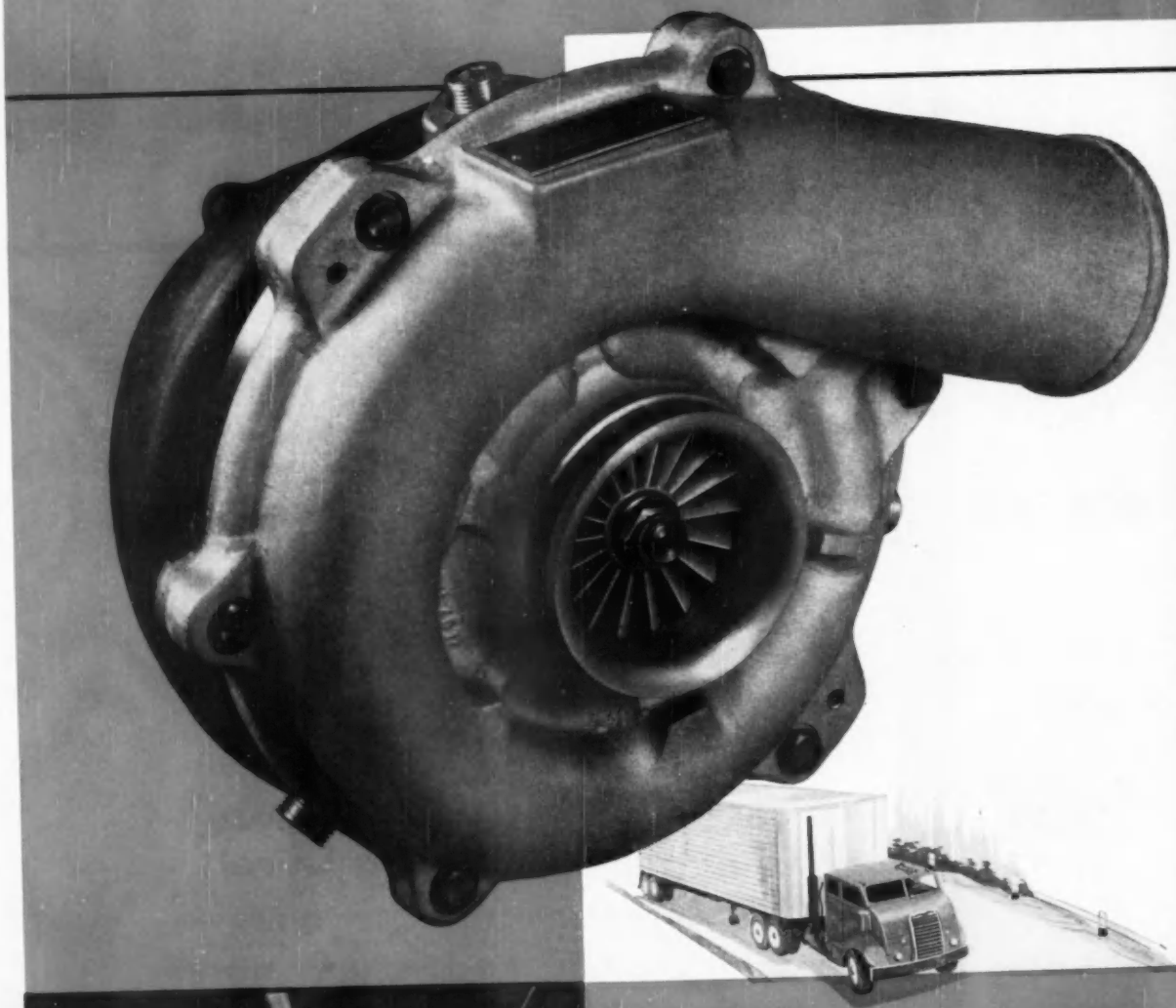
GM GENERAL MOTORS

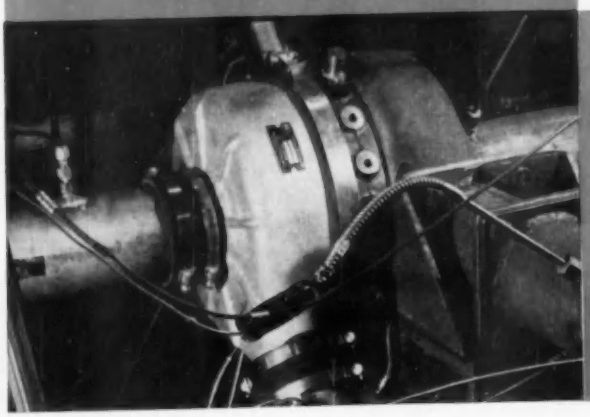
HARRISON RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N. Y.

HARRISON

TEMPERATURES MADE TO ORDER

Out of Thompson's





Simulated service-condition lab test of Thompson Turbocharger to determine capacity under varied loads and temperatures.

Aerodynamics Laboratory...

NEW THOMPSON TURBOCHARGER

simpler design, easier to service, longer life

New Thompson Turbocharger for diesel engines up to 500 horsepower combines maximum supercharging effect with a simple rotor design. Problems encountered on other superchargers with oversize shafts, split bearings, and complex diffusers are eliminated on the Thompson Turbocharger.

This new design of supercharger turns at lower speed, yet provides ample compression to meet your supercharging requirements.

For over a half-century, Thompson has been a leading designer and producer of automotive parts. This experience has been combined with our leadership in aerodynamic engineering, to produce the most efficient and simplest design of turbocharger now available for automotive-type diesel engines.

Several sizes of Thompson Turbochargers are available to supply air augmentation for diesel engines up to 500 horsepower. Engineers from the Jet Division will be glad to work with you in providing a Thompson Turbocharger for your present engine design.

This data booklet AI-157 contains information to help you equip your engines with Thompson Turbochargers. Write for it on your company letterhead.

JET DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

An Objective Approach to Jet Engine Weight Control

(*Continued from page 67*)

3. *Development growth.* As an engine progresses from a "paper engine" to a "hardware engine," the design engineers accumulate much knowledge which is used to correct initial assumptions and to improve reliability and performance. These changes nearly always result in a weight increase; therefore, a 10 per cent weight allowance is included in the objective weight for these items.

4. *Omissions.* When a new engine configuration is established, it is impossible to anticipate all items such as hoses, pipes, mounting pads, brackets, valves, etc. that will be a part of the final engine configuration. These items are factored into the objective weight by allowing a five per cent margin.

By reducing the guarantee weight 18 per cent to allow for the above items, the weight engineer establishes the objective weight. As the design progresses these margins will be consumed as planned. In order to keep the objective weight current, the weight engineer must decide the rate at which these margins are consumed. This is accomplished by determining:

1. Significant events marking design progress. For example:
A. Design release
B. First engine to test
C. Flight qualification test
D. Production qualification test

2. The quantity of the allowable margin which will be consumed during each of the above phases of design, determined by judgment and past experience.

With these items determined, a weight growth curve for the engine can be established. An example of such a curve is shown in Fig. 2. Note that the objective weight used in the initial design effort becomes obsolete after the design release. The *design limit weight*, however, represents a continuously current target weight against which the status of the engine weight can be measured. In addition, the design limit curve can be used at any time to project current weight status to an ultimate production weight forecast.

The design limit weight is of little use to the individual design engineer who is designing a compressor rotor blade or a main fuel pump. It is impossible for him to determine if his part is too heavy, if the only measure available is the weight of the complete engine. The design limit weight, therefore, must be broken into pieces small enough to be of value to the individual design engineer. Experience has shown that breaking this weight into major areas of design responsibility, usually 20 to 25 parts, is sufficient for the individual design engineer to use as a yardstick in measuring the weight of his part

(*Turn to page 144, please*)

STAINLESS STEEL MAKES THE DIFFERENCE

...its effect on modern trucking

Stainless steel sets new standards of performance for truck trailers. Experience proves that stainless outlasts and outwears other materials and is always easier to maintain.

That's because stainless is practically immune to corrosion and rust. Its inherent toughness makes it hard to dent or scratch. Operating costs are less, too, because stainless needs no paint or special finish—the beautiful smooth surface is always quick and easy to clean. Extra strength lets you carry bigger payloads safely. No wonder more and more stainless steel units are going into service each year!

For more information about stainless steel and the many ways it can help improve your automotive products—see your stainless steel supplier or write ELECTROMET...leading producer of more than 100 alloys for the metal industries, including chromium and manganese used for making stainless steel. ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 E. 42nd Street, New York 17, N. Y. *In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.

METALS DO MORE ALL THE TIME ...THANKS TO ALLOYS

Electromet
FERRO-ALLOYS AND METALS

UNION CARBIDE

With stainless steel you never compromise on strength, durability or appearance. Stainless makes bigger payloads possible, yet outlasts other materials.

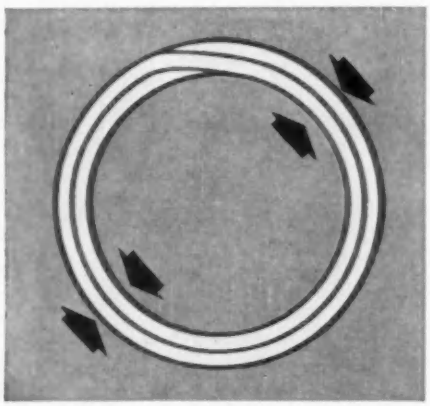
The terms "Electromet" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Only Bundyweld steel tubing

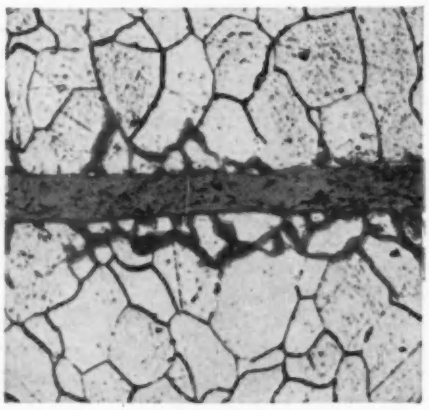
Here's why Bundyweld STEEL Tubing is used on 95% of today's cars

The illustrations below reveal why Bundyweld is specified by automotive manufacturers where strength and durability of tubing are essential. Bundyweld is the only tubing double-walled from a single metal strip. This exclusive process gives Bundyweld superior strength properties. Yet, because of the conditions under which Bundyweld is brazed and cooled, it is uniform and easy to fabricate.

BUNDY TUBING COMPANY, DETROIT 14, MICHIGAN



With Bundyweld's beveled edges and single close-tolerance strip, there's no inside bead. The tubing is uniformly smooth, both inside and out. It fabricates easily; can be bent to short radii. Copper coating, inside and out, facilitates soldering and brazing operations.



This view of Bundyweld's copper bond (enlarged 300 times) shows how the copper actually alloys with the steel . . . through 360° of wall contact. That's the secret of Bundyweld's outstanding resistance to high pressure and vibration fatigue.

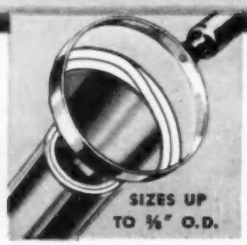
WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.



← **NOTE** the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.

g can take punishment like this!

When automotive manufacturers attempt to build a hundred thousand miles into their cars, they know they must use only the highest quality parts. That's why Bundyweld STEEL Tubing is used *in 95% of today's cars, in an average of 20 applications each.* Only STEEL tubing is tough enough, rugged enough to take constant wear and tear.

Extra-strong Bundyweld Tubing is specified for hydraulic brake lines, to assure safe stops; for oil lines, to save costly repairs; for gasoline lines, to assure leakproof performance; for push rods, to produce more powerful overhead valve engines.

Backed by expert technicians, Bundy offers advanced fabrication facilities and prompt, dependable delivery. Let us help you with your tubing problems. Write today for additional information.

There's no real substitute for

BUNDYWELD® TUBING

Bundy Tubing Distributors and Representatives: ***Massachusetts:*** Austin-Hastings Co., Inc., 226 Binney Street, Cambridge 42 • ***Pennsylvania:*** Rutan & Co., 1 Bala Ave., Bala-Cynwyd • ***Midwest:*** Lapham-Hickey Steel Corp., 3333 W. 47th Place, Chicago 32, Ill. • ***South:*** Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg., Chattanooga 2, Tenn. ***Southwest:*** Vinson Steel & Aluminum Co., 4606 Singleton Blvd., Dallas, Texas • ***Northwest:*** Eagle Metals Co., 4755 First Avenue, South, Seattle 4, Wash. • ***Far West:*** Pacific Metals Co., Ltd., 2187 S. Garfield, Los Angeles 22, Calif. • Pacific Metals Co., Ltd., 3100 19th Street, San Francisco 10, Calif.

Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

Jet Engine Weight Control

(*Continued from page* 140)

versus the design limit weight.

It must be noted that the 18 per cent reduction in allowable weight is not often "graciously accepted" by the designers. However, since the pressure is divided equally among all components and the reasoning is sound, the challenge is accepted, and all turn to the task of designing the best possible jet engine.

When the weight objectives have been established, the design and development of the engine gets under way. During the development phase of the engine, the weight engineer has three basic functions: to determine the weight of the engine from drawings and hardware: to continuously monitor these weights versus the design release weight; and to initiate any corrective action necessary in the form of weight reduction programs to assure that the ultimate guarantee weight will be met.

In order to calculate the weight of the engine, the weight calculators dissect the engineering drawings and reduce all parts to their fundamental geometric shapes. Starting with these fundamental shapes, they calculate areas, then volumes and finally weights of detail parts, and lastly the complete engine. By a similar procedure, they compute center of gravity and moments of inertia. All these calculations are worthless, however, unless they accurately reflect the weights of actual parts and of the complete engine. It was necessary to consider how tolerances, machining, welding, and fabrication practices affected the weight of the engine.

By analyzing tolerance effects on past engines and by several special studies, the facts shown in Fig. 3 have been determined. Although the theoretical weight variation of an engine is ± 5 per cent from the nominal engine, actual engine weights only vary ± 1 per cent. But far more significant is the fact that the nominal and average weights differ by one per cent. Since one of the functions of weight control

(*Turn to page* 149, *please*)

cool metal for hot planes

For jet and rocket aircraft engines, wings and surfaces that are subject to extreme conditions of heat, friction and corrosion, where the metal *must stand up* . . . design it, improve it and protect it with McLOUTH STAINLESS STEEL.

specify

McLOUTH STAINLESS STEEL

HIGH QUALITY SHEET AND STRIP

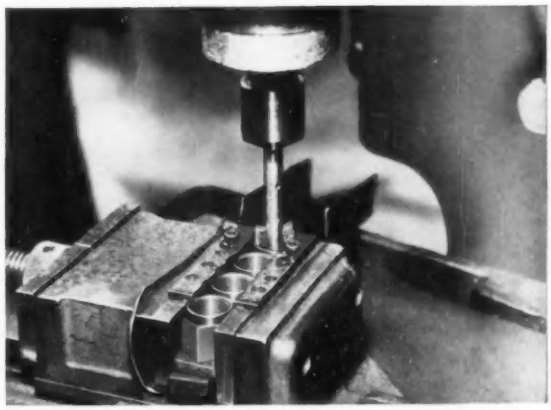
for aircraft

McLOUTH STEEL CORPORATION DETROIT, MICHIGAN

MANUFACTURERS OF STAINLESS AND CARBON STEELS

OSBORN® BRUSHING METHODS worthy of your confidence

Removing chips and burrs from threads with Osborn Situft® Brushes assures a good fit.



Before Brushing

After Brushing

Cleaning up... when the chips are down

In precision tapping, tiny abrasive chips and burrs deep down in the threads can be removed easily to assure close fit and prevent excessive wear on thread gages.

Osborn power brushing performs this operation quickly and efficiently with the simplest of equipment. Rejects, a profit-taker for any company, are cut to a minimum.

An **O**sborn **B**rushing **A**nalysis, made in your plant without obligation, may point out a number of ways Osborn power brushing can improve your metal finishing operations. For details, write *The Osborn Manufacturing Company, Department E-54, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Memo to a Man of "Parts"

The number of different parts made from Roebling High Carbon Specialties, Flat Wire and Spring Steel are close to countless.

Some things you can count on, though, are the consistent dimensional and mechanical uniformity you get with any Roebling High Carbon Specialty. They are the qualities that contribute to speeding *your* production and cutting *your* costs.

They are high qualities that make for high values. Next time you need flat wire or spring steel, specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

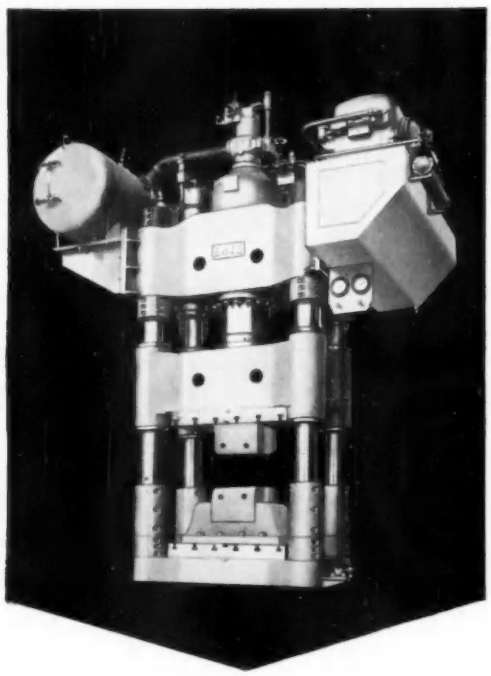
ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

PRESS or HAMMER?

..which is best for your forged product?

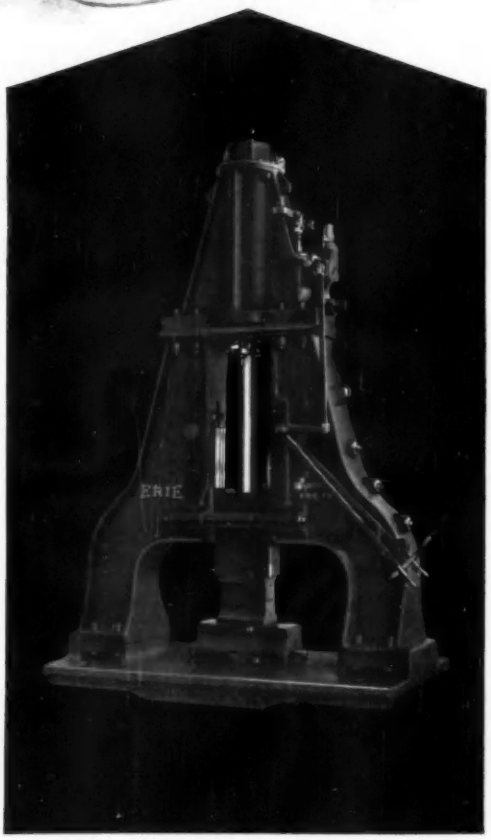


When it comes to open die forgings, there are as many different opinions on what equipment is best as there are open die forge shops and open die forgings.

But, before adding any new equipment, the wise forge shop operator talks with Erie Foundry Company . . . the firm that makes the best in *both* hammers and presses!

Erie's all-steel open die hammers, single frame and double frame, have justly earned their reputation as the industry's most rugged hammers. And now the newer, fast-acting Erie flat die forging presses are proving to be the ideal equipment for meeting the most exacting requirements for any hydraulic press.

So . . . which is best for you—hammer or press? For expert and *specific* advice, talk to the recognized leader . . . Erie Foundry Company. Just call or write.



ERIE FOUNDRY CO. ERIE 5, PA.

ERIE

World's Greatest Name in Forging Machines Since 1895

Jet Engine Weight Control

(*Continued from page* 144)

is to calculate the weight of the average engine, the reason for this one per cent shift had to be determined and factored into the calculations. Investigations revealed there were three areas where the average weight of the part was in excess of the nominal weight. These were unmachined forgings and castings, and sheet metal. Forgings and castings generally were found to be on maximum tolerance, and sheet metal approximately 2.5 per cent above nominal. With these corrections factored into the weight calculations, the calculated weight and the actual weights were in agreement by 0.1 per cent or less. Thus weight control can determine to an extremely high degree of accuracy the average and maximum weight of an engine, long before the first part exists.

This calculated weight is by itself only of academic value. It must be compared with the design limit weight to determine the progress of the design in achieving the weight goal. The most important function of weight control during the development phase is to measure progress and to determine and initiate corrective action wherever necessary.

REPORTS

The weight engineer constantly must reaffirm the objective. To do this, his comments usually are incorporated in a monthly weight report issued to keep all concerned aware of the weight status. These are brief, interesting items related to weight, such as the cost of a pound, or the effect of a pound on aircraft performance. The monthly report also should give credit for any significant weight reduction and must avoid any aspect of personal criticism. By using such means the monthly weight report becomes readable material and not a file copy.

Props often can be used very effectively to add to weight stimulation. A large bulletin board posted in the design area giving weight status by design responsibility will

promote an awareness of weight and a competitive spirit. This board can function similar to a race-track tote-board or a fund campaign thermometer. If such a board is used, it must be revised quite often, daily if possible, so that the information is current.

Pictures should be utilized by the weight engineer whenever possible. Small cartoons or sketches on the monthly weight report and design change documents affecting weight also are extremely effective. A picture of a small boy hanging from balloons, or with an anvil around his neck, placed on the first page of design change paperwork, effectively tells how this change will effect weight. A fat girl and thin girl "award" can be made to the design groups who make the largest weight increase and reduction during a given period. While some of these methods may seem childish, they help to keep the importance of light weight and the weight status in the design engineer's mind at all times. This is very important since the designer must not only occasionally search for large weight reductions, he must continually examine his detail parts for small reductions, which soon accumulate and result in a substantial overall weight saving. Only by this means can truly lightweight design be achieved.

CONCLUSIONS

Achievement of lightweight design requires closely coordinated teamwork on the part of:

(1) Management in providing *Climate.*

(2) Design engineering and manufacturing in providing *ingenuity,* and

(3) Weight control in providing *weight goals and guidance* throughout the course of design development.

The management climate must be such as to stimulate and recognize the design engineer's efforts toward light weight design. The design engineer and manufacturing groups' ingenuity must put emphasis on specific weight reductions resulting from "ounce by ounce" concentration on each part and subassembly of the product. The "ounce by ounce" approach frequently offers greater results than new mechanical design concepts applied to specific parts. In addition, weight control must be recognized as an organizational component on an equal level with design.

The objective approach to weight control, coupled with proper management climate, offers a positive method of achieving lightweight products with the associated benefits of lower cost and greater customer appeal.

BOOKS . . .

PERSONNEL MANAGEMENT, *by C. H. Northcott, published by Philosophical Library, Inc., 15 E. 40 St., New York 16, N. Y. Price, $10.00.* The author of this book defines management as the process of getting results *through* people. With this definition as a starting point, he attempts to supply the answers to such questions as: What is the objective of management By what methods is the purpose carried out? What are the implications of the emphasis on human relations? The author discusses at length two major activities of personnel management—organization and industrial relations—and has many things to say also about wages.

Why designers specify FLEXLOC self-locking nuts

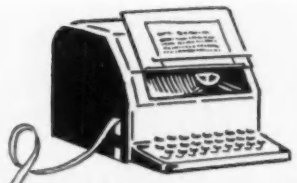
Where products must be tough . . . must stand up under vibration, shock and abuse . . . designers specify rugged, reliable, precision-built FLEXLOC self-locking nuts as fasteners.

HERE'S WHY:
FLEXLOC locknuts are strong: tensile strengths far exceed accepted standards. They are uniform: carefully manufactured to assure accurate, lasting spring tension in the flexible locking collars. And they are reusable: rough screw threads, repeated removal and replacement, frequent adjustments will not affect their locking life.

Standard FLEXLOC self-locking locknuts are available in a wide range of standard sizes and materials, to meet the most critical locknut requirements. Your authorized industrial distributor stocks them. Write us for complete catalog and technical data. Flexloc Locknut Division, STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.

FLEXLOC® LOCKNUT DIVISION

STANDARD PRESSED STEEL CO.
SPS
JENKINTOWN PENNSYLVANIA



ON OUR WASHINGTON WIRE

Air Force officials, in the face of current Congressional economy sentiment, intend to stick closely to a "tight" machine tool procurement policy. New tools to modernize production lines will be purchased only when a "specific manufacturing cost saving can be demonstrated by a contractor." Thus, there won't be any subsidy feature in the Air Force tool modernization program.

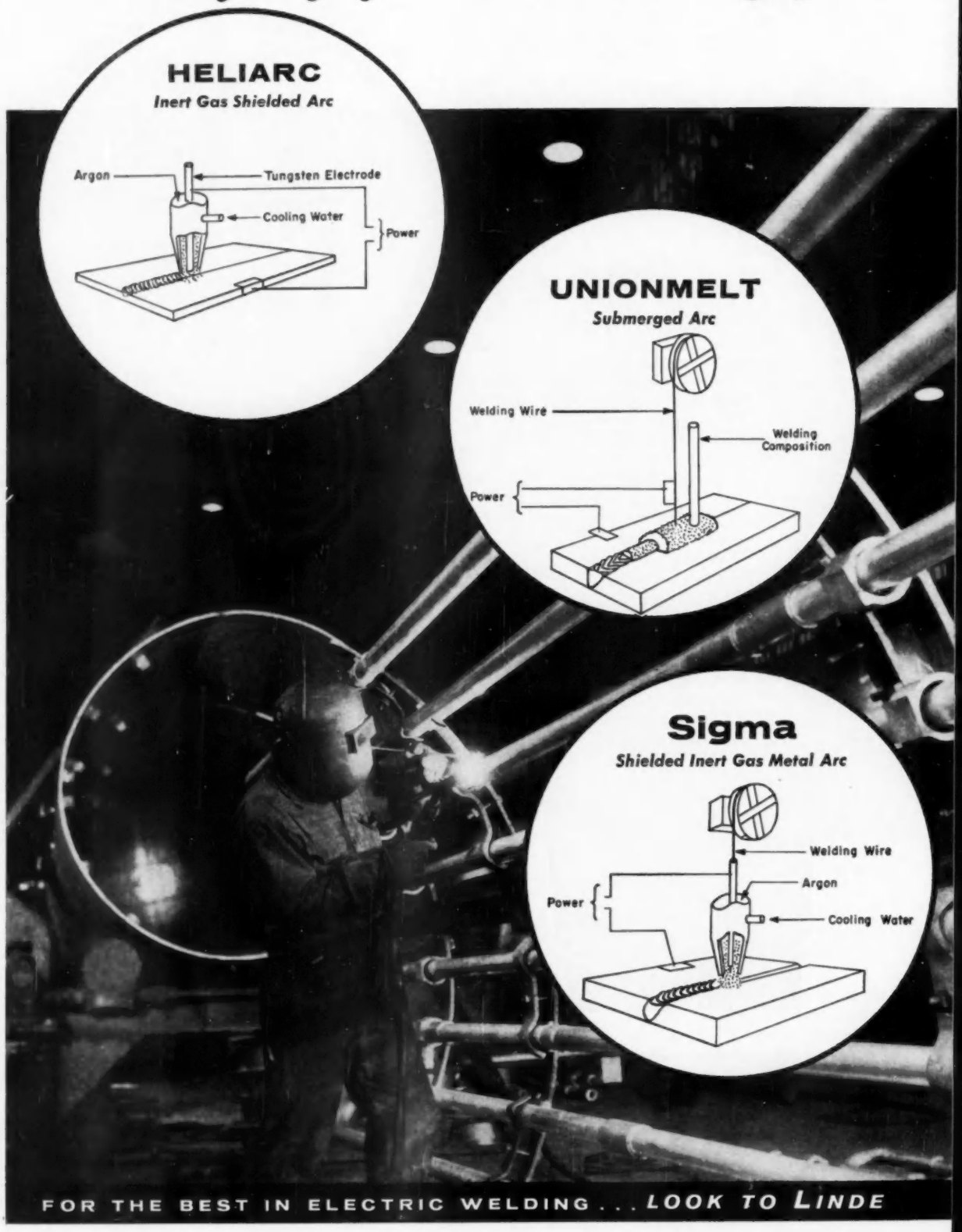
Motorists are spending more this year to keep their cars in first-class running order. Figures available to the Government show that total outlays may top $5 billion for 1957.

Businessmen expect to increase their outlays on new plant and equipment through the third quarter of this year, according to Dept. of Commerce-Securities and Exchange Commission survey. Capital investment programs are expected to be at seasonally adjusted annual rates of $37.3 billion and $37.9 billion, respectively, in the second and third quarters of 1957.

President's Committee on Traffic Safety will step up its program for public support of safe driving methods early in 1958. As in 1956, the committee will sponsor four regional meetings to urge decisive local and state action.

Air Force indicates its cutback in aircraft procurement is only a few months away. Vigorous competition among planemakers for the Air Force dollar in the 12 months that began July 1 is expected. Emphasis will be on modernization and improvement of a shrinking number of combat air wings only, and some step-up in missile procurement, in the next year.

For any of your welding jobs



. . . LINDE can supply the *right method!*

Inert gas shielded arc welding—

HELIARC Apparatus for inert gas shielded arc welding, using a tungsten electrode and a shield of LINDE argon, is tops for joining hard-to-weld commercial metals. On stainless steel and aluminum, HELIARC Welding is fast and clean, producing high-quality welds that resist corrosion. HELIARC Welding eliminates costly grinding and finishing, making it a valuable method for quantity production of hard-to-weld metals.

Submerged arc welding—

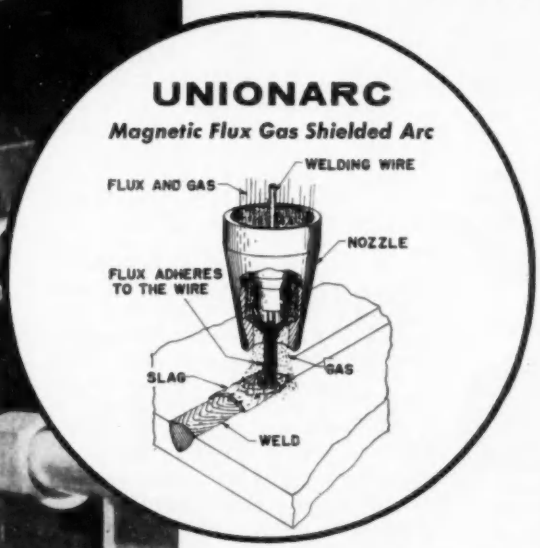
Shapes made of materials ranging from light gage to heavy plate, adaptable to mechanization, can be most economically joined by UNIONMELT Welding. It is used on low and medium carbon steels and alloy steels, including those containing chrome and/or nickel. UNIONMELT Welding is also used extensively for resurfacing metal, providing extra wear and corrosion resistance. UNIONMELT Welding is fast and inexpensive on production jobs.

Shielded inert gas metal arc welding—

One of the most versatile welding methods is Sigma Welding. LINDE's Sigma apparatus, using a shield of LINDE argon, is ideal for manual welding of commercial metals ⅛ in. or more thick, and for automatic operation on lighter gage metals to .050 in. Highest quality welds can be made on aluminum thicker than ⅛ in. at speeds up to 16 inches per minute. Build-up and surfacing jobs are also improved by using LINDE's Sigma welding method.

New! Magnetic flux gas shielded arc welding—

UNIONARC Welding, LINDE's most recent development in electric welding, is an extremely fast method for welding mild steel. This method employs a continuously-fed, bare steel wire electrode, magnetically coated with flux conveyed in a stream of carbon dioxide shielding gas. Manual welds can be made easily in any position—vertical, overhead, downhand—with no stops to change electrodes. The speed, versatility, and ease of operation of of UNIONARC Welding brings costs down 25% to 65% below those of manual covered electrode welding. Clean, smooth, high-quality welds are provided, even in the presence of moderate amounts of rust, scale, and moisture.



Engineers at LINDE have been designing, developing, and testing electric welding methods and apparatus for many years. Help on any welding method is yours for the asking. You can improve your work and cut production problems by taking advantage of LINDE's experience. For data on UNIONARC Welding or any other electric welding method, call the LINDE office nearest you.

LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

Linde TRADE-MARK

UNION CARBIDE

The terms "LINDE," "HELIARC," "UNIONMELT," "UNIONARC," and "UNION CARBIDE" are trade marks of Union Carbide Corporation.

MADE TO FIT

French Motor Car Design During Next Five Years

By Fernand L. Picard
PRESIDENT, SOCIETY OF
AUTOMOBILE ENGINEERS (FRANCE)

ENGINE

The four stroke cycle engine will remain the only one used by the large manufacturers and as concerns the layout we see little change excepting, perhaps, a tendency toward horizontal opposed cylinders. All of the engines for mass produced cars will be of the overhead valve type a single camshaft in the crankcase. The raising of the octane number in the fuel available will permit raising the compression ratio, which is now at from 7-7.6/1, to 7.5-8.25/1.

It is possible that the use of air-cooling which has marked up gains for small displacement engines in the past 10 years will be extended to larger displacement. Finally, engine speeds will increase slowly aided by small cylinder bores, the average bore of the present-day French engine being 68.5 mm, and the adopting of stroke to bore ratios equal to or less than one.

TRANSMISSIONS

If the automatic transmission has difficulty in being adopted either in French or European cars, it is because a certain number of technical economic and even psychological factors have been, up to the present, against it. However, at least a part of the advantages of automatic shifting, such as that offered by the automatic clutch, appears up to the present to find a most encouraging welcome among buyers. Taking account of this tendency and the change which increasing traffic conditions will soon bring to the minds of car owners, one may reasonably predict:

(1) For automatic clutches, the price of which may be reduced in reason of increased demand and a simplification of designs actually being used: notable progress in the class of cars having less than 1300 cc displacement, in spite of the increased cost which tends to handicap its adoption, and a more marked acceptance in the 1300 cc to 2000 cc displacement category where approximately 50 per cent of the production should be equipped with this advance in five years.

(2) For automatic gearboxes handicapped by their price and where the demand is yet not clear, there will be a limited number used on cars with displacements bordering on or exceeding 2 litres.

SUSPENSION

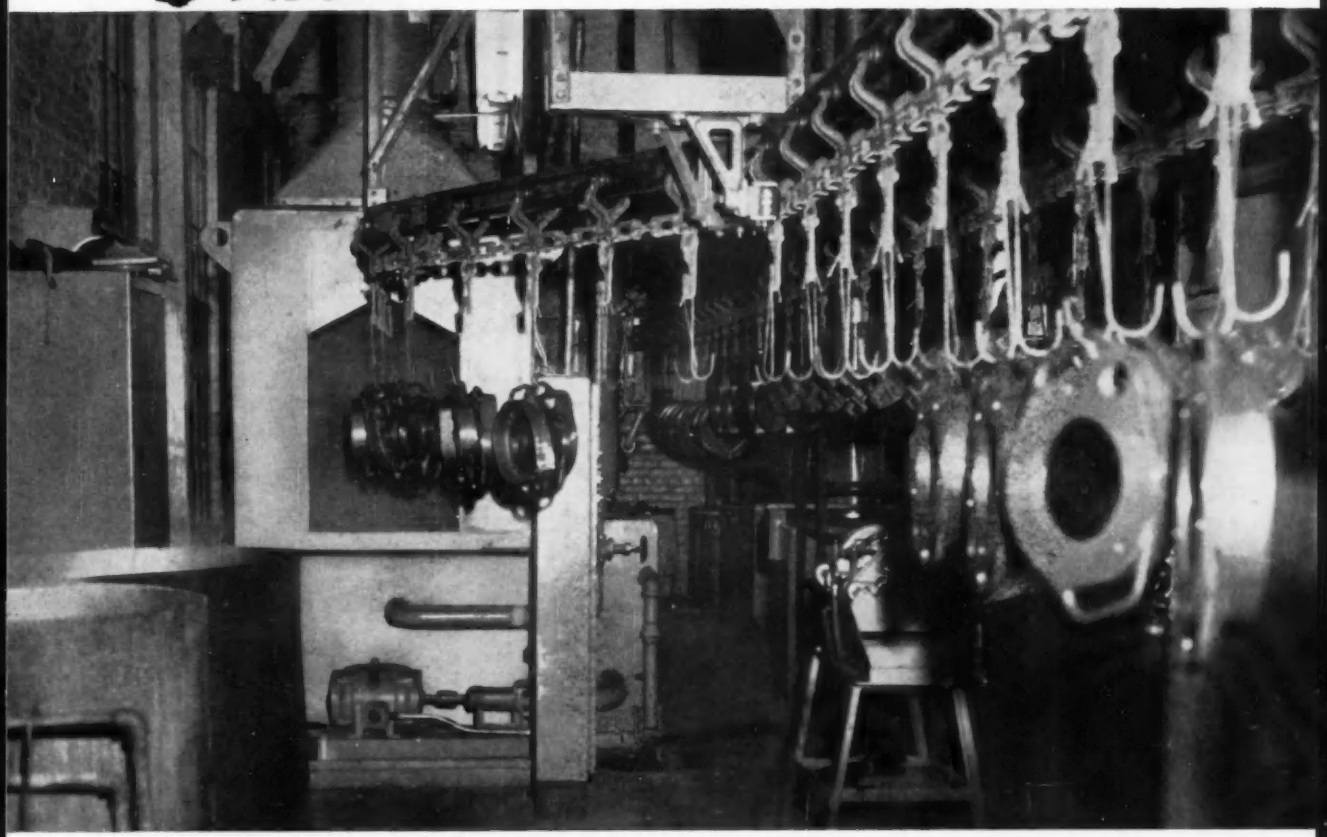
In this zone design can only follow the path of continually bettering comfort by a softening of the ride studied in view of and accorded with perfect road holding. The ways are known and one may, taking into account the improving of existing devices, and the cost angle, look forward to the following steps in their adoption:

(1) Cars of larger piston displacement will tend toward complete pneumatic or oleo-pneumatic suspensions which must have central pumping and distributing centers giving a sufficient output at necessary pressures. These systems will be fitted with a

POWER SPRAY WASHERS

by PETERS-DALTON

Are Designed, Engineered, Built and Installed To Utilize Limited Plant Floor Space



Plant engineers are frequently faced with serious limitations of available space when searching for locations to install greatly needed production equipment. Problems such as these are met daily by Peters-Dalton. More than a quarter century of designing, engineering, fabricating and installing finishing equipment has qualified P-D to readily meet needs such as these.

The illustration here is of a P-D Gas Fired Single Stage Washer, designed to handle miscellaneous machine castings up to 35 lbs. in weight at a rate of 5000 lbs. per hour. The photograph clearly illustrates the careful planning required to make this important installation "fit," while still giving maximum productivity.

Why not send us your requirements, along with a layout of the area in which you plan an installation? Just write, wire or phone . . . we'll be glad to tell you more.

Representatives in principal cities.

- *Hydro-Whirl Paint Spray Booths*
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wide variety of corrective controls both static and dynamic to level the vehicle and will be fitted with a wide variety of shock absorbers, hydraulic, hydropneumatic or pneumatic with plastoviscous or a purely dynamic (damper) action.

(2) Mixed suspensions, that is, suspensions comprising ordinary spring designed for a maximum of comfort with the car empty and from there on aided by low pressure pneumatic devices with static leveling on at least one axle, have every chance to make progress on medium sized cars where their installation appears to be relatively simple.

(3) There will be a tendency toward rubber or mixed (rubber-metal) on the smallest cars, as elastometric springing aided by plastoviscous control should permit a combination of sufficient oscillation control and a very low price.

STEERING GEAR

The rack and pinion steering gear, which is simple and cheap, can be easily installed if the front of the car is clear of obstacles. Direct and reversible it is particulary satisfactory when it is installed in cars so light as to not have a tendency to steer hard. It will continue to gain ground on small displacement cars.

Worm and gear steering gears mounted on roller bearings, which are more expensive, need, for proper geometry, steering links which facilitate installation when the front end is cluttered up. Having great gear reduction they are well adapted to driving conditions and easy parking in cars of medium or large size i which domain they should hold its own.

As to power steering, the greatest real obstacle to its use lies in the low weight of our cars which make any mechanical aids unnecessary. It may make progress in very large cars where weight distribution tends, as in the front wheel drive, to heavily load the front suspension.

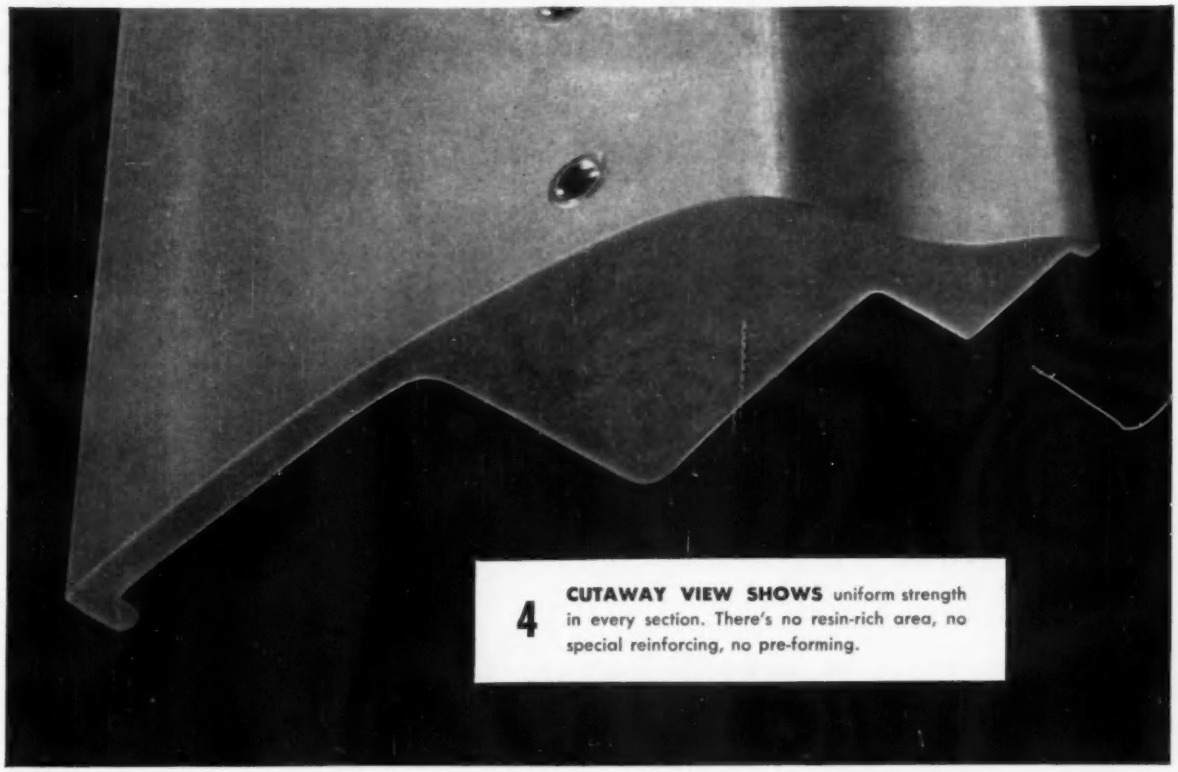
BRAKES

Among the solutions which are proposed are the disk brakes which are found in the front wheels of a French production car. However taking into account that increased speeds are scarcely desirable and that design trends are towards light construction the brake problem is not acute where light cars are concerned, and also inasmuch as the disk brake, up until now, does not present itself as a specifically economical solution, it does not look as though it will have

1 This premix consists of reinforcing material, such as fiber glass or sisal, thoroughly mixed with polyester resin containing Dow Styrene.

2 The premix molding compound flows evenly to each and every section of the closed die as it is compressed under heat and pressure.

3 After a very short cycle, the finished premix molding is removed from the die. It is now ready for immediate assembly or shipment.



4 **CUTAWAY VIEW SHOWS** uniform strength in every section. There's no resin-rich area, no special reinforcing, no pre-forming.

For lower bids: premix moldings

For uniform strength: polyester resin with Dow Styrene

Many complicated parts—especially parts with varying wall thicknesses—are now made better, at lower cost, by premix molding. There are no resin-rich areas. Strength is uniformly distributed. Pre-forming is eliminated. And holes and nozzles can be molded in a part, eliminating punching and drilling operations.

Leaders of the automotive and appliance industries have proved the benefits of premix moldings for specific parts. Many innovations are now on the drawing boards.

The product shown is an example of the many now being made by premix molding using Dow Styrene. For technical assistance on Dow Styrene, write THE DOW CHEMICAL COMPANY, Midland, Michigan – Plastics Sales Department PL1886G-2.

Photographs through the courtesy of Fabricon Products, River Rouge, Michigan

YOU CAN DEPEND ON DOW

any great development or expansion in the five coming years.

ELECTRICAL EQUIPMENT

Equipment manufacturers are bending every energy to the develpment of semi-conductors and principally to that of transistors. It is possible that during the next five years one will pass to the manufacturing stage replacing direct current generators and voltage regulators by systems with alternating generators and transistors. In the measure that these latter can be manufactured at an acceptable price, simplification, a weight saving of 30 to 40 per cent, and better service will be the eventual advantages of this solution. Electronic ignition now in its first swaddling clothes will probably bring about a betterment of ignition quality, a lower wear rate than that of our breaker points, and the possibility of more easily employing high compression ratios.

The foregoing is an abstract from a paper presented by the author at the Summer Meeting of the Society of Automotive Engineers.

BOOKS...

1957 COLLECTED TECHNICAL PAPERS, *published by American Society of Tool Engineers, 10700 Puritan Ave., Detroit 38, Mich. Price, members: $5.00; non-members: $10.00.* This book contains 43 separate papers, including the first Eli Whitney Memorial Lecture, by Louis Polk; and two complete Symposia, each consisting of 12 papers, on ceramic and plastic tooling. The papers were presented at the Silver Anniversary Convention of the ASTE.

HIGH SPEED DIESEL ENGINES, *by Arthur W. Judge, published by D. Van Nostrand Co., Inc., Princeton, N. J. Price $12.00.* The first edition of this book was published in the early days of the development of the high-speed, compression-ignition engine. This edition—the fifth—has been largely rewritten to include new information; several new chapters have been added, notably those dealing with supercharging, small vehicle engines, air-cooled engines, special purpose engines, and the starting of engines. The author's treatment of the subjects is never too technical, a point which should recommend it to students as well as engineers involved in the production or use of Diesel engines.

AVIATION FACTS AND FIGURES, *published by American Aviation Publications, 1001 Vermont Ave., N.W. Washington 5, D. C. Price, $1.00.* This is a compilation of facts from hundreds of sources in the world of aviation gathered together during the past year. Among the subjects covered are: military aviation, guided missiles, research and development, general aviation, helicopters, airlines and transportation, and U. S. and foreign export. An abundance of illustrations and tables supplement the text.

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271 Manufacturers of Precision Engines Specify FRAM as Original Equipment!

No other filter line on the market is used on so many vehicles or specified by so many manufacturers. Here's why:

- **FRAM** pioneering research has introduced more new developments in filtration than any other manufacturer—for example, the revolutionary new FRAM *Filtronic*® Carburetor Air Filter and the new Easy Change Oil Filter.
- **FRAM** research Laboratories work closely with automotive engineers in the solution of filtration problems.
- **FRAM** Filters are preferred by more motorists than any other brand.

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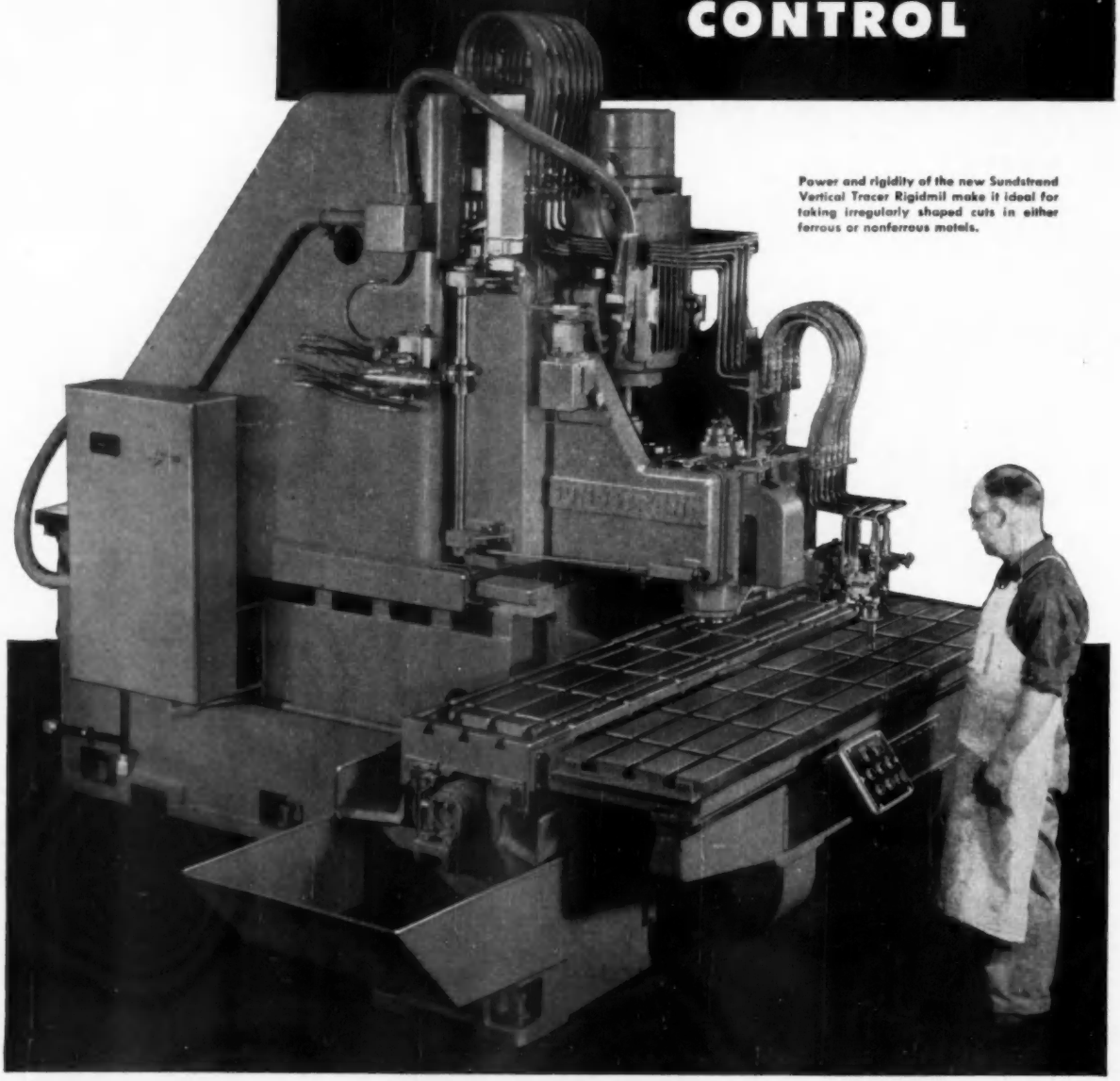
NEW

SUNDSTRAND VERTICAL TRACER RIGIDMIL PROVIDES 3-DIMENSIONAL CONTROL



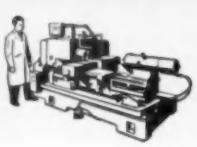
Power and rigidity of the new Sundstrand Vertical Tracer Rigidmil make it ideal for taking irregularly shaped cuts in either ferrous or nonferrous metals.

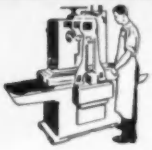
SUNDSTRAND

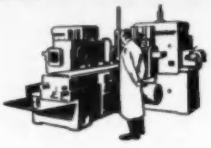
*"Engineered Production" Service**

*REG. U.S. PAT. OFF.

AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS



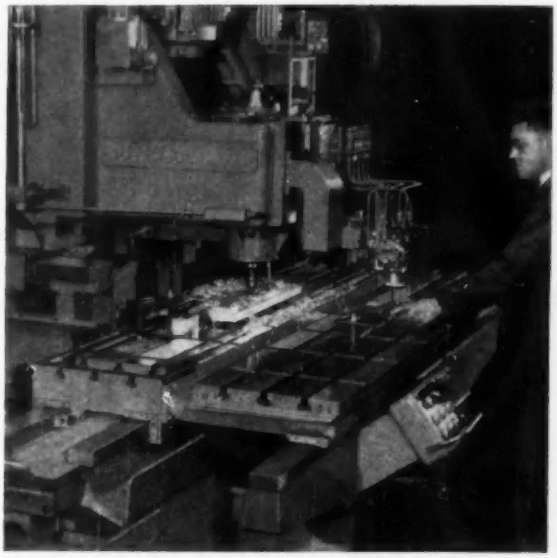




SIMULTANEOUS control of horizontal, vertical, and cross feed is an outstanding feature of the new Sundstrand Tracer Rigidmil. Adequate power for milling from the solid is provided by the 30 hp milling head. You're sure of being able to use the right cutting speed for machining ferrous or nonferrous metals with either HSS or carbide because the Vertical Tracer Rigidmil has both wide speed range and rigid construction.

Vertical spindle head has a low speed range of 52 to 307 rpm at a maximum of 15 hp and a high speed range of 338 to 1990 rpm at 30 hp maximum. Speed range required for a particular machining job is selected with the two-position lever conveniently located on the side of the head. Additional speed changes within the range selected are made by pick-off change gears.

Head is mounted on vertical ways of a cross-traveling column. The vertical travel of the spindle head is 20″ and cross-travel is 24″ (12″ either side of table centerline). Machine and template tables both have a working surface of 18″ x 90″. Machine table travel is 60″. Head carrier cross feed and table longitudinal feed are infinitely variable between 0 and 28 ipm. Both have a rapid traverse rate of 80 ipm.

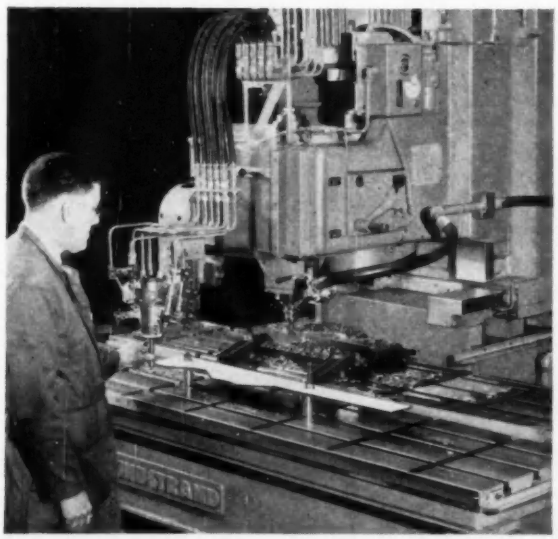


Shown above is the Vertical Tracer Rigidmil performing 360 degree tracing on aluminum parts.

TYPICAL CUTS

Here are only a few of the irregularly shaped cuts that can be made on parts such as bulkheads, wing spars, wing caps, etc. in either ferrous or nonferrous metals.

Sizable cuts are readily handled when machining steel because machine combines high horsepower with rigid construction.

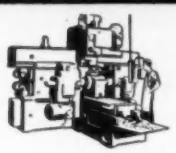


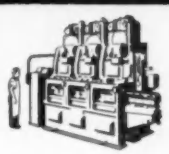
The pencil-type stylus control can be set for either 3-dimensional tracing or for 360-degree tracing in the horizontal plane. When using 360-degree tracing, depth is controlled precisely by means of eight manually selected, adjustable vertical stops. The valve has a quick-change stylus chuck and manual adjustment for limiting maximum feed rate.

More Tracer Milling Facts

. . . using the new Vertical Tracer Rigidmil are contained in Bulletin 281. Write for your copy today.

TRIPLEX RIGIDMILS | SPECIAL MACHINES





SUNDSTRAND
Machine Tool Co.
2571 Eleventh St. • Rockford, Ill., U.S.A.

"Engineered Production" Service

FOR BROACHING

SUNDSTRAND

It takes all 3

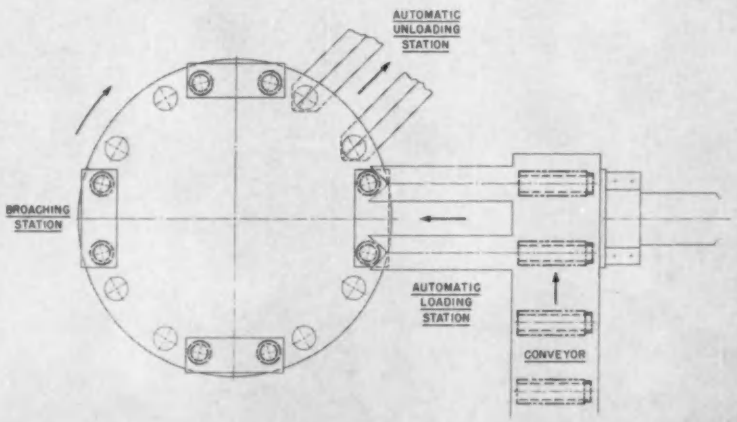
American's *"Engineered Production"* Service . . . gives the broach-user the complete three-part service that is essential to obtain the most practical broaching method. Years of design and production engineering experience, unavailable at any price, are effectively added to your staff at no extra cost.

THE JOB — Broaching the I.D. of transmission brake sleeve parts, two at a time, in a fully automatic cycle with a high production rate required.

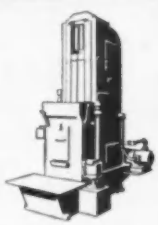
THE RESULT—300 completed parts per hour in an electrically controlled and interlocked automatic cycle.

1 PROPER BROACH TOOL DESIGN

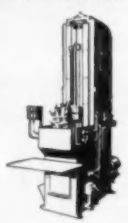
Top-quality results on any broaching operation require starting the job with design of the broaching tool itself. In solving this all important first step, American Broach considers stock removal, length and width of cut, finish tolerances required, etc. High-quality work and long tool life result because broach and machine are designed to operate as a team. In this installation the two broaches move downward simultaneously during the cutting stroke. Next, the table indexes and the two broaches are returned to retriever automatically for return to starting position for the next broaching cycle.



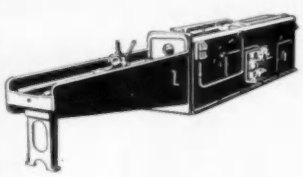
Broaching Tools



Three Way



Single Ram

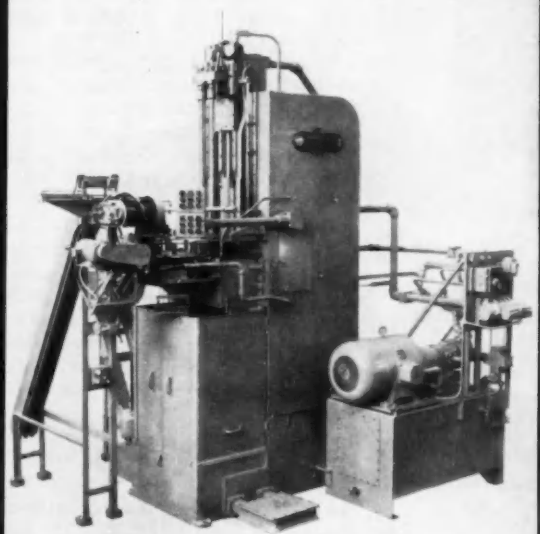


Horizontal

to give you peak broaching performance

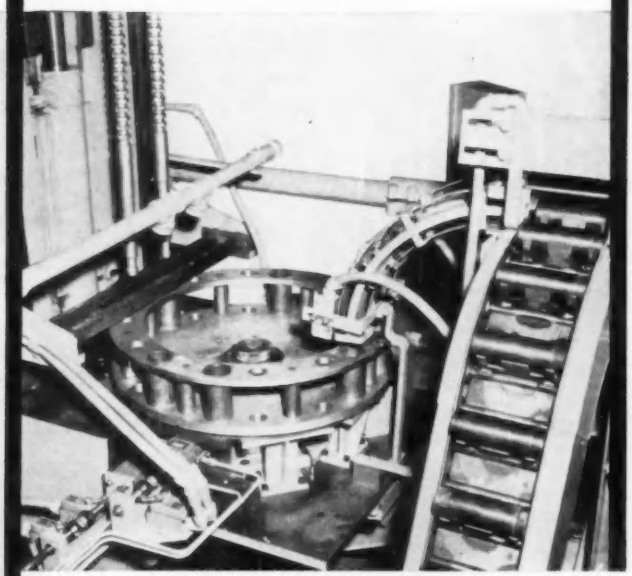
2 SPECIFYING THE RIGHT MACHINE

Production rate required, length and speed of stroke, relationship to other production machinery, available floor space, etc. determine the selection of the broaching machine capable of doing the best job. At American, machine selection follows design of the broaching tool. This vertical hydraulic internal pull-down machine is provided with separate hydraulic circuits for machine operation and index unit. Part elevator is motor-driven, uses air cylinder for parts loading.

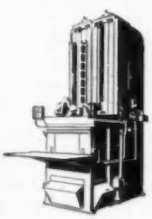


3 EFFICIENT FIXTURING

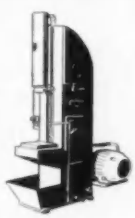
Whatever your parts geometry or hourly needs, fixturing by American Broach forms the vital third link in the production chain. As shown in the close-up, two parts are loaded at a time in the eight-station dial type indexing fixture. Discharge is automatic as parts ride off skid plate and drop into discharge chute. This installation is another example of how "skills" built into the tool, machine, and fixtures make sure that production schedules can be maintained even with inexperienced operators.



Get more facts in American's Pull-Down Bulletin A216. Write for your free copy today.



Duplex Ram



Presses

SUNDSTRAND

American

BROACH & MACHINE DIVISION

SUNDSTRAND MACHINE TOOL COMPANY

ROCKFORD, ILLINOIS

Executive Responsibility in Today's Industry

By Clifford F. Hood, President
United States Steel Corp.

MANAGEMENT is always a product of the times in which it operates, and it seems that executive responsibility has been given an almost judicial character through the recognition that the interests of business are, in substance, coincident with the interests of the economy and the nation as a whole. The business executive of today—and without question, tomorrow as well—must think and plan in terms compatible with the ever-changing viewpoints of our society.

It is understandable that there should be constant change in a nation where men have been granted freedom of thought and action. Few things, aside from the basic laws and fundamentals by which mankind and the universe are governed, remain constant for any great length of time. An article in the newspapers several months ago described scientific studies which show that the universe itself is in a perpetual state of evolution.

Throughout our entire national history, we have conducted a constant search for a better way of achieving progress. It is basic to our way of life, and one of the most outstanding examples of this search lies in the evolution of the American business organization and the imaginative approach to progress in the science of management through an understanding of the over-all task of American enterprise.

Until comparatively recent times, business was a relatively simple operation. In fact, many of our early enterprises consisted of a single individual who was the investor, the manager, the salesman, and the production employee all in one. With a small amount of capital to purchase a few basic tools, one person could launch an industry, and many did—just as it is still being done today.

For the industrious and ambitious, however, the procedures of business soon began to grow in complexity. The man who produced a good product at a fair price found his markets expanding, and he hired others to accomplish those tasks which he did not have time to perform. Improvements in transportation and communications, crude as they may have been by modern standards, brought problems of distribution and advertising. Greater production meant greater amounts of raw materials, and mechanical developments introduced new elements into the age-old area of competition.

It was in this manner that American industry grew in stature as well as in physical size. To purchase a mechanical loom for the manufacture of textiles or to build the equipment needed to roll and otherwise shape products from iron and steel, required more capital than one individual could save or borrow, and the idea of a corporate trusteeship was introduced into the American business system. This development, plus a growing

This development, plus a growing

awareness of the relationship between day-to-day costs and corporate success, necessitated such additions to the business process as accurate financial, production and other records.

But most important, the business manager found that in all this growth, he had acquired some very definite responsibilities. He was first of all responsible for the savings that others had invested in his business. And if this wasn't enough to give him sleepless nights during periods of economic recession, he could also ponder the fact that he was indirectly responsible for the financial incomes of an ever-increasing number of people, aside from his primary responsibilities to his employees.

I refer, of course, to the manner in which American industry has always been inter-related. No business in this land exists in a sphere of activity all its own. It has its suppliers, in the same manner that it has customers, and business, big and small, has worked together to build the industrial potential of America. A few years ago, for example, United States Steel constructed a new integrated steel mill in Eastern Pennsylvania. In the process of erecting that plant, we used the services of more than a hundred thousand companies, from the smallest possible business to some of the nation's largest enterprises, located in every section of the land and employing millions of people.

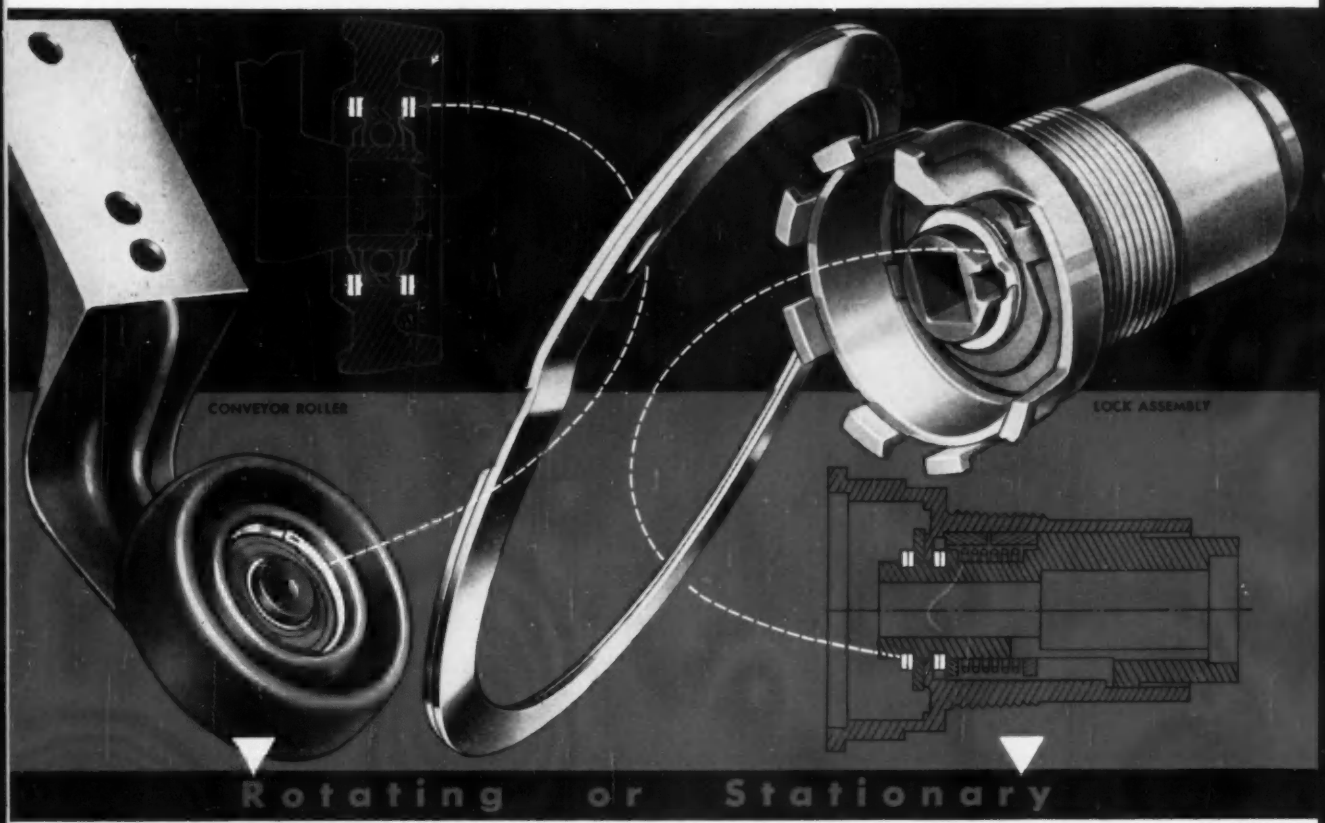
This inter-relatedness of business, moreover, is not just occasional. It happens every day. A short time ago, one of the so-called "big businesses" of this nation revealed that to produce its own consumer products, it was dependent upon some 55,000 other firms which supply it with items that range from ground corn cobs for polishing bearings to heavy shipments of steel.

Each of these lines of supply which connect American business, of course, has tended to broaden executive responsibilities through the years, and has contributed to the situation where periods of national crisis have brought the businessman national responsibilities. The intervening years of peace in this century have also thrust upon him the obligation of converting technical advances into productive realities for a constantly rising population. In peace and war alike, there have been the growing problems of business economics and the awareness and projection into prominence of that vital and imponderable subject we define as human relations.

Today, every business leader is confronted with the task of perpetually building and maintaining an organ-

(*Turn to page* 172, *please*)

there are hundreds of ways in which Industry uses **SPIROLOX** to solve retaining problems



assemblies retained with SpiroLox look neater, last longer, use fewer parts, are easier to take apart and put together

Wherever parts rotate, wherever parts are to be secured on shafts or in housings, wherever moving parts must *hold* together —Spirolox Retaining Rings do the job better! Even on rotating assemblies, as shown in the conveyor roller application at left above, Spirolox attains neat, compact, simplified design. The stationary application of a lock assembly (right above) illustrates how Spirolox can be applied in those hard-to-reach places where the retaining ring must operate in a very confined space.

Exclusive Spirolox Design makes possible a variety of applications that is almost limitless. Secret of this design is the patented Spirolox *two-turn construction*, which ELIMINATES THE GAP and makes possible a UNIQUE LOCKING CHARACTERISTIC. A step or offset, formed in the ring so that the two turns are parallel, *bridges the gap* found in conventional retaining rings. Result: better conformability, even in the most restricted places. The effective locking property of Spirolox is created by a "friction lock", formed under thrust between the two turns. Result: greater holding power to make the ring STAY PUT in its groove.

The success of Spirolox construction proves itself not only in superior operation. It also makes possible easier installation, less-complicated machining, simplified servicing and quicker dismantling of assemblies retained the Spirolox way. These compact spring-steel rings spiral into their grooves easily, saving many man-hours in manual installation. Spirolox Rings adapt easily to fixtures for automatic production line installation. They eliminate costly machining and special tools. Spirolox Rings facilitate maintenance and servicing in the field because they come out at the flip of a screwdriver, ready for re-use. Thus, factory-adjusted or assembled units REMAIN UNCHANGED, even after repeated dismantling operations during servicing or repairs.

HANDY, ILLUSTRATED SPIROLOX CATALOG is yours without cost or obligation. It may be your key to simpler, lighter, more compact machinery or parts. If you wish, send us a print of your product and our engineers will point out Spirolox application possibilities. Thompson Products, Inc., Piston Ring Division (Ramsey Corporation) Dept. H, St. Louis 8, Mo.

U.S. Pat. No. 2,450,425 and Foreign Pats. Other Pats. Pend.

R-6012RT

the better way

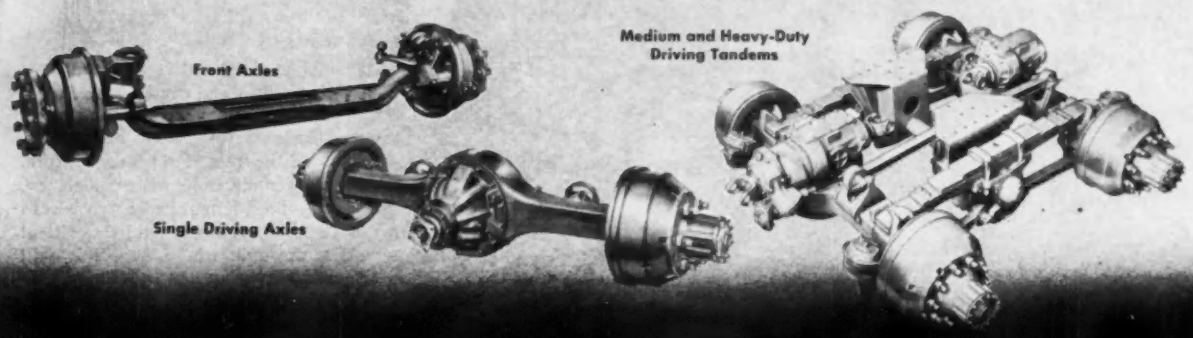
SpiroLox RETAINING RINGS to hold moving parts TOGETHER!

Write for Samples

gapless • concentric • requires no special tools • easy-in, easy-out • re-usable • stays put

(*Turn to page* 172, *please*)

Axles and Brakes for Commercial Vehicles



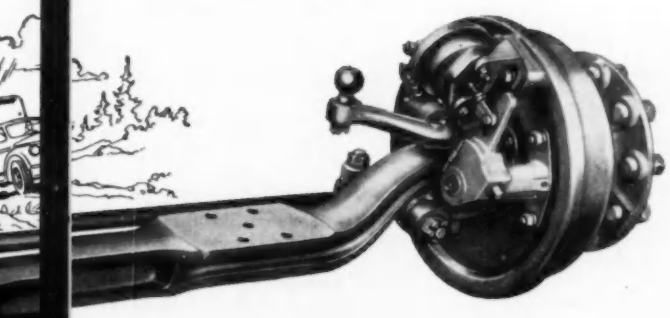
Products of

Rockwell Spring and Axle Co.

TIMKEN-DETROIT FRONT AXLES OFFER YOU GREATER STABILITY, SAFETY AND SERVICE!

You get better vehicle performance—under all conditions—with the F-900 Series Front Axles. Superior Timken-Detroit design and construction features give you front end stability—maximum strength and balance.

These improved Front Axles reduce driver fatigue . . . make steering easier . . . hold the driving path better . . . offer greater maneuverability . . . and contribute to increased vehicle life and superior performance.



Forged Axle Centers of high carbon steel are specially hardened for greater strength. The unique "Equalized-I" design between the spring pads provides uniform resistance to both horizontal and vertical forces.

Forged Knuckles of Alloy Steel are hardened for best metallurgical characteristics . . . are of improved design with large size spindles. A generous fillet where the spindle joins the knuckle body gives additional stiffness. These design features along with shot peening assure utmost strength.

Forged Steering and Tie Rod Arms are also of alloy steel and hardened. Stub arm design with carefully proportioned sections give these arms extra stamina and rigidity.

True Sphere Ball Studs in steering and tie rod arms have generous radii for maximum strength, and are induction hardened for long wear.

WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS, BUSSES AND TRAILERS

Executive Responsibility

(*Continued from page* 168)

izational structure that is attuned to changing times and conditions. In the face of present-day conditions, moreover, the structure must be able to withstand the impact of all encounters, and be conducted with efficiency, economy and humaneness, so as to render the service exacted by a critical public through whose grace it will either decay or prosper.

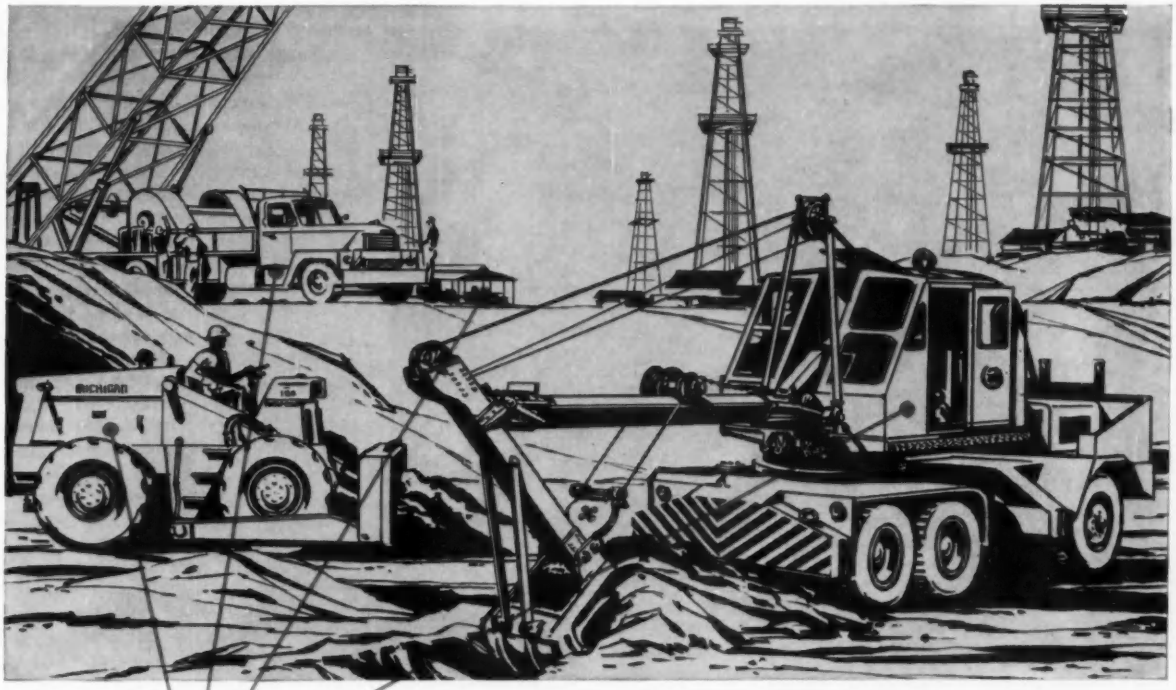
The most difficult function of executive management, in light of these changes, is not necessarily one of command, but that of developing the will and desire of every member of the enterprise to work together for a dominant single purpose. It is in accepting such a responsibility that the industrial executive of today finds increased need for a yardstick of fundamentals to measure each task. My personal yardstick consists of three categories—balance, continuity and emphasis—which are basic to any activity, whether one is managing a business or conducting a symphony.

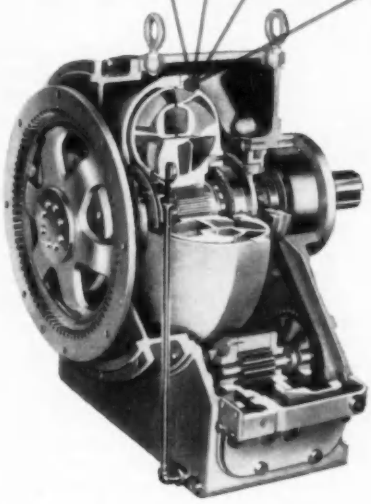
It has been my belief that unless a business or an individual seeks to measure every effort against these three factors, the final result will fall short of the success which could be attained. Suppose we consider some of the specific responsibilities of today's industrial executive in the light of balance, continuity and emphasis.

I suspect there are few factors more vital to effective business management than maintaining balance throughout every aspect of one's company, and the balance I have in mind begins with the individual himself and his efforts to maintain equilibrium in his outlook toward each segment of the business. He must recognize, for example, the basic concepts of effective and efficient organization. Among his powers of leadership should be the ability to duplicate himself in others and delegate authority to them. He should be aware of the business truth that discipline is the control circuit of any organization, and possessing such knowledge, he should utilize it largely to motivate people.

Possession of these and other capabilities, however, is not enough for an individual in a position of leadership. He must be able to utilize these abilities with sound judgment and skillful balance, if he is to develop an organization that is, in turn, well-balanced and constantly seeking the ultimate in productive capacity.

In speaking of balance, I would be remiss if I did not mention the spe-





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You are sure of top engine performance and minimum wear when you use a Clark Torque Converter. Your engine may be operated all the time at its most efficient speed, with power output adjusted to the job's torque demand. And the smooth, steady flow of shockless power eliminates shock loads—reduces strain and wear on all working parts, in engine *and* power train.

These features are dependable working proof of Clark excellence:

- **True Hydra-Foil Blade**—an exclusive design of blade contour, maximum efficiency in torque build-up
- **No Cavitation**—proper oil flow prevents turbulence and air pockets to cause efficiency losses and wear
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- **Self-Contained Oil Circuit**—oil sump and passages cast in housing. No unnecessary fittings, no leakage
- **Complete Line**—horsepower 15 to 600; diameters 11" to 26"

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cific area of human relationships and the fundamental need for a balanced outlook toward these relationships by every member of management. From the level of the front-line foreman to that of the chief administrative officer, there are human factors to be considered, and no one should be permitted to climb the proverbial management ladder until and unless he has demonstrated an awareness of the human element in the individual equation.

Several years ago, many members of management were startled by various reports on the attitudes and opinions of industrial employees. These reports indicated that a considerable group still exists among the members of industry who do not recognize the mutuality of interests between management and employees. Perhaps we have concentrated too much of our attention on the organizational aspects of the objectives of management and, by this unbalanced approach, have failed to stress to our workers the basic fact that only attitudes of cooperation, willingness and understanding can successfully increase personal opportunities and personal success.

I have long believed—and many business analyses bear me out—that the most complex problems of present-day management, are problems in human understanding. People represent the greatest asset that any business can possess, and understanding their instincts and desires, their emotions and beliefs, their habits of thought and action, is one of the requisites to maximum industrial achievement. And just as the business leaders of tomorrow will undoubtedly be those individuals in groups such as this who can answer the questions in human relationships, so the leading industries of tomorrow will be those that stimulate their management people to recognize that the functions of management thread their way through every human activity.

Every business is created in the hope that it will remain a perpetual member of industry. Those entrusted with directing the affairs of business, therefore, acquire the second fundamental responsibility — continuity. This is not only an essential function of management, it is also a very complex one, whereby each problem and each plan of action is viewed from the standpoint of its ability to give continuity to the organization and the enterprise itself.

There is, for example, the matter of building a reservoir of executive talent fully capable of meeting the challenges of industry with imagination, vision and determination. It was recently estimated by a manage-

ment consultant that 42 per cent of industry's top management personnel are in the age bracket from fifty-five to sixty-five. If this estimate is correct, one easily can understand why business firms from coast to coast are seriously concerned with efforts which will assure continuity of leadership.

Another vital area which cannot be overlooked in maintaining the continuity of a business is the task of developing industrial research facilities to their highest potential so that research planning and activities are always many years ahead of actual demands. Likewise, there are the parallel responsibilities of creating new markets for the endless line of items brought forward by research, and always, there remains for the business leader the problem of seeking out new avenues of efficiency in manufacturing operations.

Of most importance, however, are two critical and inter-related subjects facing all of us today on this very matter of continuing our respective businesses as part of American industry. During recent years, our nation's economy has grown at a phenomenal rate. From 1950 to 1955, national income climbed an estimated 35 per cent. Personal income increased 35 per cent, and the gross national product rose an astonishing 37 per cent.

The factor behind this economic progress was our industrial know-how and vision. But corporate earnings did not experience a period of equal growth. The *New York Times* pointed out in an article on this subject that the 1955 ratio between total revenue and profits before taxes was no better than the ratio achieved some 30 years ago, in the so-called Roaring Twenties.

Corporate profits after taxes have been on a roller-coaster for many years. During the years from 1950 to 1953—a period of unbroken business prosperity—corporate profits after taxes reached one of the lowest points since the end of World War II. Even last year's estimated profit—measured in constant dollars—was below the balance remaining after taxes a full eight years ago.

Yet in the face of this, we are encountering demands for unheralded industrial expansion. One estimate made about a year ago stated that all industry would be required to make a total investment of some $580 billion in capital for replacement and expansion purposes before another decade passes.

Industry, big and small, must find and put to use almost $1 billion in in-

vestment capital every six days for the next 10 years.

Business leadership in this nation has directed great effort toward maintaining continuity in national progress. Such commonplace items of today as television, nuclear energy, penicillin, jet-propelled aircraft and nylon fabrics were only laboratory curiosities 25 years ago. Just as it was engineering and scientific genius which developed these items, it was management decision which brought them out of the laboratory and management direction which placed them upon our assembly lines and sent them to the American marketplace. We learned long ago that fundamental theory is always required in advance of applied theory and practice. By the same token, this awareness with respect to the physical sciences has equal importance in the social sciences, which include the science of management.

If we are to sustain continuity in our industrial progress, therefore, it will be through the application of a high degree of imagination, energy and effort toward better understanding of business profits. In United States Steel, for instance, our general company objectives are: "To make and sell quality products competitively, and to perform those functions at the lowest attainable cost consistent with sound management policies, so as to return an adequate profit after taxes for services rendered. As a corollary objective the Corporation must be the low-cost producer of the products it offers for sale."

We recognize, however, that we cannot cntinue to meet those objectives unless our employees, our customers and the public are fully informed on the role of profits in perpetuating our national way of life. For this reason, we are presently taking steps to bring about greater awareness of the profit picture and the financial needs of our company, and I understand that a number of industries have similar programs in action or in the planning stages.

I am certain you will agree that it is foolhardy to develop industrial leadership for tomorrow, or point our research efforts into the distant future, or seek to stimulate new markets for our products, unless we first recognize the responsibility to keep industry financially sound and economically stable. We cannot build the economic future that has been blueprinted for us, unless we have the necessary economic tools. The only time-tested manner by which we can continue to progress is to assure business management the freedom and the wherewithal to maintain and advance industrial facilities.

And this brings us to the third and final measure—the matter of emphasis—in the responsibility yardstick. A brilliant future awaits America and its industry; however, in achieving this, business management must emphasize judgment, common sense and human understanding in the leadership it extends to the members of industry and the people of this nation. If this leadership is dynamic, if it is expressed as incentive leadership, wherein human activities are directed toward high and desirable objectives, then no goal will remain unattainable.

Each business day provides countless opportunities to emphasize those things which we know to be right and necessary to the continuation of our economic way of life. Regardless of one's separate responsibilities, whatever his level along the management scale, he owes it to the industry of which he is a part and which he helps to direct, to stress those principles which are fundamental to free competitive enterprise.

Every member of management, for example, gives emphasis to a basic ingredient of our industrial system

(*Turn to page* 180, *please*)

How to be a magnetic tape recording expert

Introducing a useful new brochure on tape in instrumentation

Tape is the stuff of which memories are made – the versatile data memories for a jet propelled age of electronic miracles. If you are one who keeps up with times and techniques, it is a field well worth knowing. This new brochure gives a wide-angle view of the whole subject.

Typical pages

What kinds of applications do you think of when magnetic tape recording is mentioned? Sound recording, of course, and telemetering, if you are in that business. But what about simulating a rough road to test truck axles, controlling a milling machine to cut an aircraft wing section out of a solid billet, monitoring for a sudden occurrence that may happen only once in a year or two, recording data that can be reduced to graphs and tabulations without ever being touched by human hands? These and many more are described.

How significant is the fact that magnetic tape recording reproduces data in the same electrical form in which it was recorded? Enormously important, when you realize all the things the reproduced data can do that couldn't be done with the original signals or with the common forms of visual recording. For example the data can be slowed down to look at fast transients. It can be speeded up for wave analysis. It can be read out in any form. A tabular comparison between original signals and taped signals gives the full story. And a step-by-step pictorial demonstration of magnetic tape recording and reproduction puts the electrical-data idea into tangible, easily visualized form.

What does the data on magnetic tape look like? You can't see it, but the brochure will give you an idea of what it would be like if you could. And incidentally this may help to clarify the differences between various magnetic-tape-recording techniques.

Do you talk in tape's language? When is a tape recorder not a recorder? What is the difference between a channel and a track? What is a servo speed control? A much needed glossary gives the consensus of our views on terms.

For whom did we write this booklet . . . the expert, or the man for whom the whole subject is new? Both. It is written and illustrated so that any engineer or technically trained person can readily grasp the concepts and gain a broad understanding of the subject. If you are one of those who has already worked extensively with tape, you will find some new twists in the way the subject is explained, and perhaps ideas on new areas you hadn't explored. And incidentally, a copy of this brochure in some handy file will give you a good start in indoctrinating that new man in the department.

For your copy, write us today on your company's letterhead. Address your request to Department W-5.

MAGNETIC TAPE APPLICATIONS BY AMPEX

5

ONE OF A SERIES

Series FR-100

Series 800 Mobile and Airborne

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FIRST IN MAGNETIC TAPE INSTRUMENTATION

934 CHARTER STREET · REDWOOD CITY, CALIFORNIA

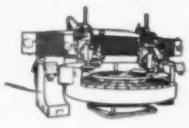
District offices serving all areas of the United States and Canada; Foreign Representatives in countries around the world.

NEW Frauenthal 1200 Series single spindle vertical precision grinders

Bird's-eye view of a new Frauenthal 1200 Series (belt-driven) single spindle, vertical precision grinder. These versatile machines are designed to meet a broad range of present requirements . . . are readily adaptable to future requirements.

F PRECISION PRODUCTION VERSATILITY

2200 Series
72-150" Swing

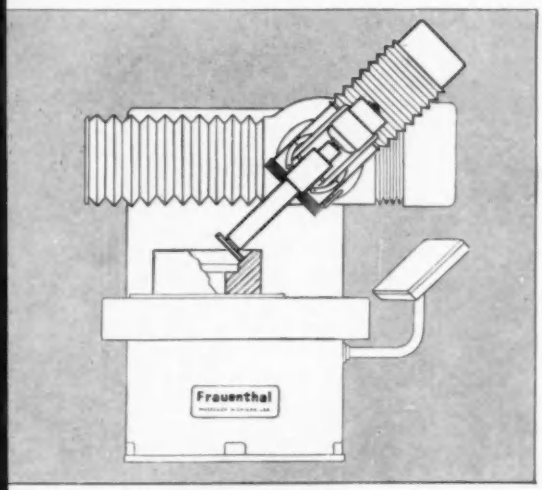


1800 Series
60-72-84" Swing

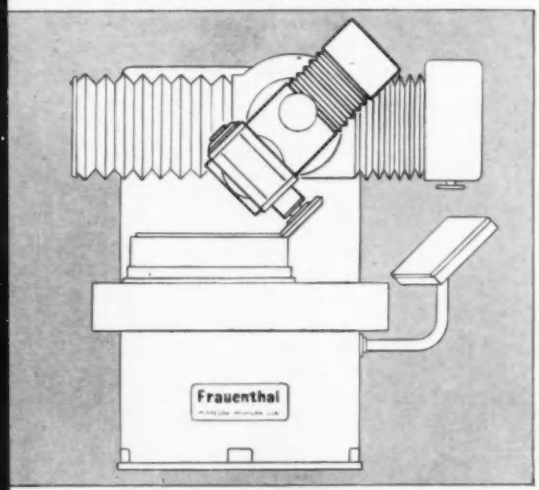
3100 Series
60-72-84" Swing

creatively engineered

...accuracy to .000100" at spindle nose



Frauenthal belt-driven Model 1224B and 1236B single spindle, vertical precision grinders have an extreme angle setting of compound at 45°. Versatility such as this permits angle, internal, external and face grinding to millionths-of-an-inch related tolerances.



Frauenthal direct-connected Models 1224D and 1236D are ideal for rotary surface grinding, O.D. surface and angular approach grinding operations. A variety of grinding spindle positions is possible with this head arrangement.

assures uniform, super-precision part after part!

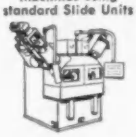
Super-precision is the natural result of overall Frauenthal single spindle, vertical precision grinder rigidity; of proven performance . . . and *continuous* application of advanced grinding techniques.

These new Frauenthal 1200 Series machines are available with choice of belt-driven or direct-connected grinding spindles. Machines with either spindle arrangement are offered with 24" dia. tables x 36" swing and 36" dia. tables x 48" swing capacities inside splash guards. Additional swing can be obtained by removing guards.

Write for free Bulletin

1200 Series
36-48" Swing

Special Grinding Machines using standard Slide Units



Frauenthal Division
THE KAYDON ENGINEERING CORP.
MUSKEGON, MICHIGAN, U. S. A.

Executive Responsibility

(*Continued from page* 176)

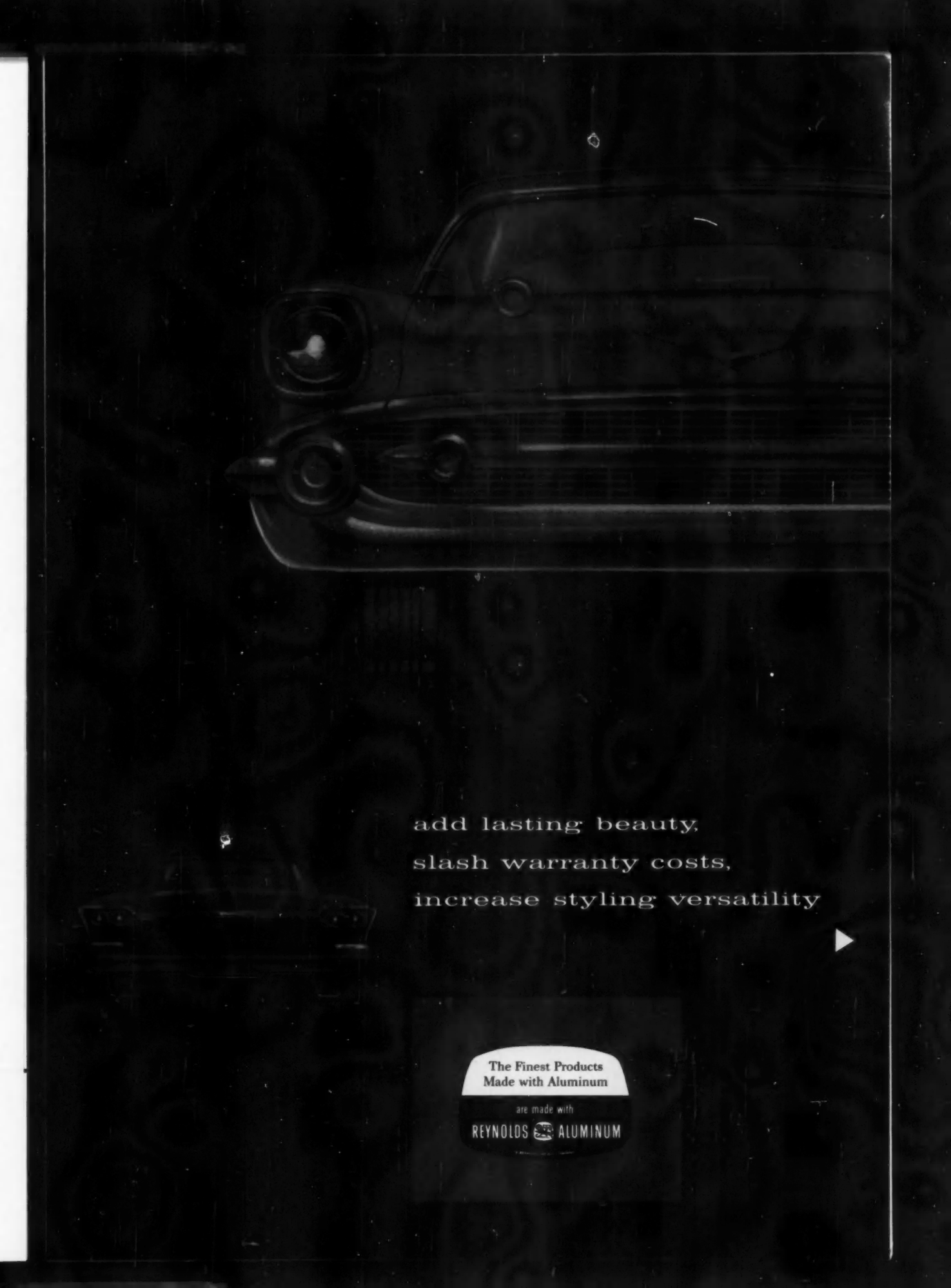
when he places integrity above all other virtues in his day-to-day business affairs. Perhaps no other characteristic among men is more indicative of their moral caliber than the honesty they display in their dealings with one another.

The overriding concept of business and its progress in the future must be predicated on a new understanding of the material and the spiritual. Life, as it is being experienced in many quarters today, cannot continue much longer to be based on the debilitating theory of constantly "taking out." There must be a giving of one's self which emphasizes the necessity to put something into the till of life, as well.

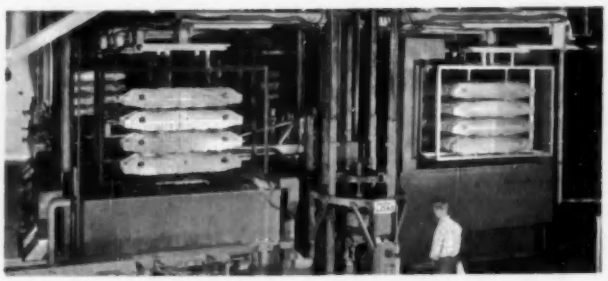
Several decades of experience have proved beyond question that unless there is knowledge of the purpose of free enterprise, combined with a recognition of its obvious results, we cannot expect to have it accepted, developed and improved by succeeding generations of our people. Every policy and statement set forth by management, every industrial meeting and program, fails in its ultimate purpose if it is not conceived and carried out in the interests of what Peter Drucker termed "our free society and our free economy."

It has been said, and rightly so, that "the future belongs to those who prepare for it." In a very real sense, this is the fundamental purpose behind your development program, and certainly all of us should be concerned with the future—that is where we are going to spend the rest of our lives. It is equally true that the challenges and opportunities which lie ahead for American industry will never cease to grow in size and importance.

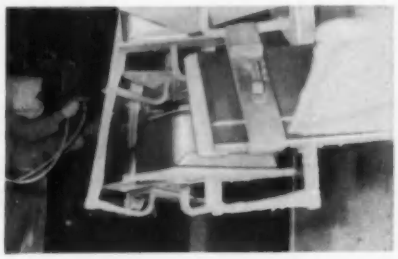
The foregoing is an abstract of a talk delivered last month by the author at A. & M. College of Texas.


add lasting beauty,
slash warranty costs,
increase styling versatility
The Finest Products
Made with Aluminum
are made with
REYNOLDS ALUMINUM

This new Reynolds anodizing installation can handle parts ranging from small automobile trim parts up to parts 24' long, 12' high and 4' wide. This half-block long system is another new addition to Reynolds multi-million dollar finishing facilities investment...an investment that assures the automotive industry highest quality finishes on aluminum parts.

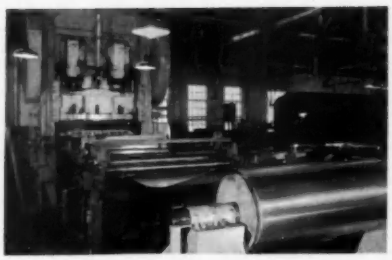


This new Reynolds automatic aluminum finishing system can finish mixed sizes and types of automobile parts and chemically brighten or anodize them in different colors—and can handle several different jobs at the same time. An automatic coding system establishes the individual finishing specifications for each job.



Reynolds can paint entire parts a solid color, mask and paint or do paint filling in combination with mechanical finishing to supply most desired effects.

Part of a battery of Reynolds new high speed buffing equipment used here on hood moldings for a 1957 automobile.



Part of a battery of high speed coil fed presses at Reynolds producing at the high rate necessary to meet automotive industry requirements.

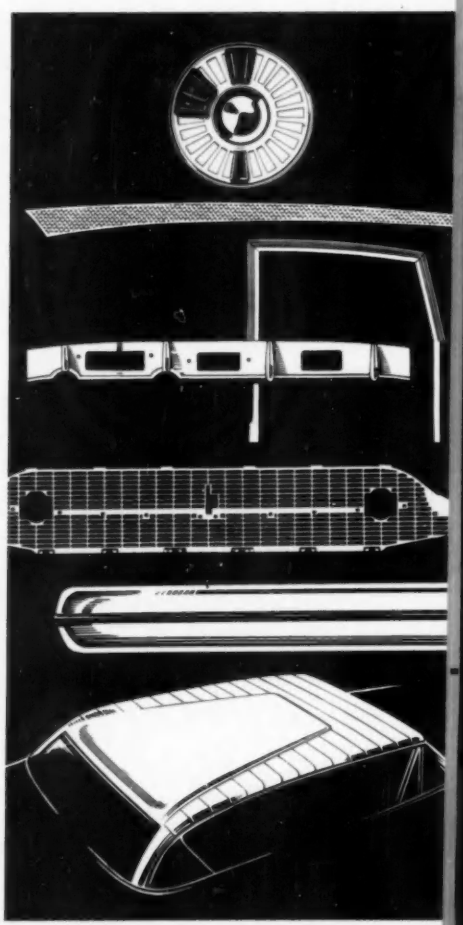
Aluminum grilles are a good example of the many ways the automotive industry is adding beauty, cutting costs and increasing design freedom with aluminum.

Aluminum grilles with gleaming clear or color anodized *in-the-metal* finishes will never chip, pit, peel, flake or rust. There's added sales appeal in this lasting beauty feature. There's also an important saving for manufacturers through *reduced warranty costs*. Flexibility in design, low cost styling changes, reduced finishing costs and saving in weight are still more advantages of beautiful aluminum grilles.

Reynolds can produce aluminum grilles by assembling extrusions, assembling roll formed shapes, stamping from sheet or by perforating specially designed extruded shapes. For lower production quantities, assembled or perforated extruded grilles offer definite cost advantages. For higher production quantities, stamped grilles offer tremendous savings in finished part costs. Whichever type you design can be produced economically and efficiently by Reynolds, and Reynolds modern finishing facilities will give your grilles the finish your latest styling requires.

The photos above are examples of the vast fabricating and finishing facilities that Reynolds offers the automotive industry. From these facilities come sales appealing *color anodized* parts with the "gleam of gold" and *clear anodized* parts with the "look of sterling". From these facilities come quality parts . . . quality controlled from mine to finished part and backed by Reynolds technological know-how in producing and fabricating aluminum. *Economical* parts, too, because of Reynolds tremendous variety of the most modern fabricating and finishing equipment.

For details on these facilities and for the assistance of Reynolds Aluminum Specialists on mill product applications or on fabricated parts, contact your nearest Reynolds Office. Or write *Reynolds Metals Company, Fisher Building, Detroit 2, Michigan* or *Reynolds Aluminum Fabricating Service, 2007 South Ninth Street, Louisville 1, Kentucky.*



*REYNOLDS ALUMINUM—THE METAL FOR AUTOMATION**

*TRADEMARK

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

REYNOLDS ALUMINUM FABRICATING SERVICE

BLANKING • EMBOSSING • STAMPING • DRAWING • RIVETING • FORMING
ROLL SHAPING • TUBE BENDING • WELDING • BRAZING • FINISHING

AI TABLOID

(*Continued from page* 37)

Martin Co. recently assembled its 1000th Matador guided missile.

* * *

Hercules Powder Co. has started commercial production of a new type of polyethylene plastic material at a new plant in Parlin, N. J.

* * *

Westinghouse Electric Corp. will design and manufacture experimental seagoing handling and launching systems for Polaris ballistic missiles.

* * *

Minneapolis-Honeywell Regulator Co. has completed the transfer of most of its inertial guidance engineering effort to its new Aeronautical Div. facility at St. Petersburg, Fla.

* * *

Fairchild Engine & Airplane Corp. has announced that a secret military project—the Goose—is forcing it to expand its main plant at Hagerstown, Md.

* * *

Enjay Co. has announced the opening of new sales offices at 16301 West Seven Mile Road, Detroit, Mich., and another at 1410 Canal St., New Orleans, La.

* * *

Massey-Harris-Ferguson, Ltd., has bought the assets of Mid-Western Industries, Inc.

* * *

Cessna Aircraft Co. has announced a new and improved version of its twin-engine commercial Model 310 known as the 310B.

* * *

Handley Page, Ltd., has developed a civil jetliner version of the Victor jet bomber.

* * *

A National Naval Aviation Meet will be held in San Diego, Calif, from Aug. 5 to 10.

* * *

Yale Materials Handling Div. of Yale & Towne Mfg. Co. has set up industrial lift truck sales and service sub-branches in Baltimore, Md., and Harrisburg, Pa. The Cleveland sales and service branch has moved into larger quarters at 3560 E. 93rd St. and established sub-offices in Youngstown and Akron, O.

(*Turn to page* 186, *please*)

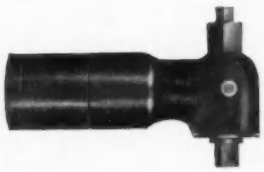
A NEW AIR DRIVER WITH

For Screw Driving or Nut Setting

WITH INTERCHANGEABLE ATTACHMENTS
(Always a feature of Keller Tools)

IN-LINE—HIGH PRODUCTION

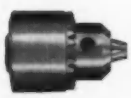
Drives: Straight, positive, cushion or "Safe-Torque".
Finders: Standard, collet, magnetic.
Holders: Snap-in, magnetic.



HEAVY DUTY—HIGH PRODUCTION
Single-end, double-end, long, short models.
In-line or detachable drives listed above.

LIGHT DUTY — CONFINED SPACES
90°, 45°, single end, double end.
Direct drive only.

***RATCHET WRENCH—IMPOSSIBLE JOBS** Variety of sockets, lengths, thicknesses.
Open end, 20° angle, unusual adaptations.



***DRILL—HIGH PRODUCTION**
Straight or angle type.

*Requires different gear case.

NEW No. 2 MOTOR
With advanced design . . . styling

INCREASED SPEED—TORQUE RANGE
INCREASED POWER
LOW NOISE LEVEL
LOW MAINTENANCE

Bulletins 12-101 and 16-301

PRECISE TORQUE CONTROL

The new "SAFE TORQUE"* clutch assures accurate torque control for the new, more powerful in-line screw drivers and nut setters featured on the opposite page.

CONTROLLED TORQUE from 10 to 108 inch-pounds. Easily preset to predetermined torque. Retains accuracy on long production runs.

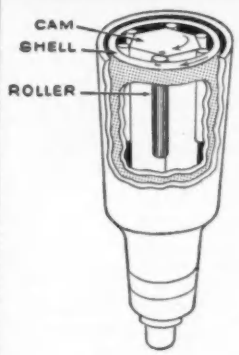
ACCURATE TORQUE setting on any fastening job—compressible, non-compressible, paper-thin or stacked materials.

SIGNALS OPERATOR with audible click when clutch automatically disengages at preset torque. No over-ride impacting. Tamper-proof.

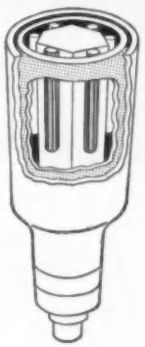
NEW MECHANISM INTERCHANGEABLE with cushion clutch mechanism in present 000, 00 and R size Keller tools.

*Licensed Trade-Mark of Scully-Jones and Company.

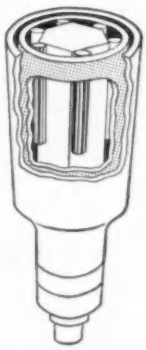
"SAFE-TORQUE" SPEEDS ACCURATE PRODUCTION



DRIVE—Equally spaced rollers are positioned between raised cam surfaces and the inside of a shell. Slight pressure on the bit causes rollers to climb into wedging position. The rotating clutch outer shell then transmits drive through rollers to cam and bit. Upon reaching a torque resistance which elastically deforms the driving shell, the rollers ride over high spots on the cam.

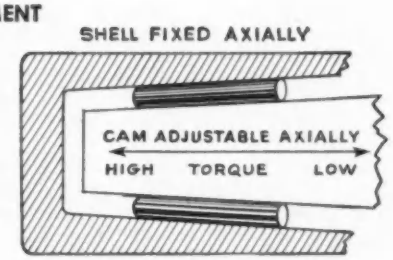


FREE WHEELING—The clutch is now in free wheeling and will so remain when the tool is lifted. No power is transmitted to the bit.



READY TO DRIVE—Instantly, upon applying bit pressure to the next fastening, the clutch again engages to repeat driving action. No lost driving motion . . . no sliding surfaces to create frictional wear.

TORQUE ADJUSTMENT—No tools needed for torque adjustment. Calibrations on the adjusting collar permit preset torque from 10 to 108 inch-pounds. Tamper-proof by operator. Bulletin 12-81.



CALL YOUR KELLER TOOL SPECIALIST TODAY FOR A DEMONSTRATION

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

AI TABLOID

(*Continued from page* 183)

Flexonics Corp. has licensed Yaco, S. A. Buenos Aires, Argentina, to manufacture synthetic and plastic hose assemblies under the Flex-O-Tube trade mark.... Formsprag Co. has licensed Renold Chains, Ltd., to manufacture clutches under Formsprag patents for sale outside the U. S.

* * *

Martin Co. expects to resume flight tests of the P6M SeaMaster in the late Fall. Design changes are being incorporated in the aircraft's tail.

* * *

Electric Auto-Lite Co. has developed an electronic device to check automotive storage batteries during assembly before any activating acid is passed. . . . All American Engineering Co. has developed a new turbine-powered catapult for launching high-speed aircraft from short airfields.

* * *

E. F. Drew & Co., Inc., is currecently celebrating its 50th anniversary. The company's Automotive Div. makes radiator cooling system chemicals, brake fluid, silicone polishes, industrial and aviation chemicals, special detergents and cleaning compounds, degreasers, and decarbonizers.

* * *

Globe Industries, Inc., plans to build a new $1.5 million plant near Trotwood, O.

* * *

L. R. Kerns Co. has opened a subsidiary located in Orange, Calif., to produce industrial metal processing compounds and specialized chemical products.

* * *

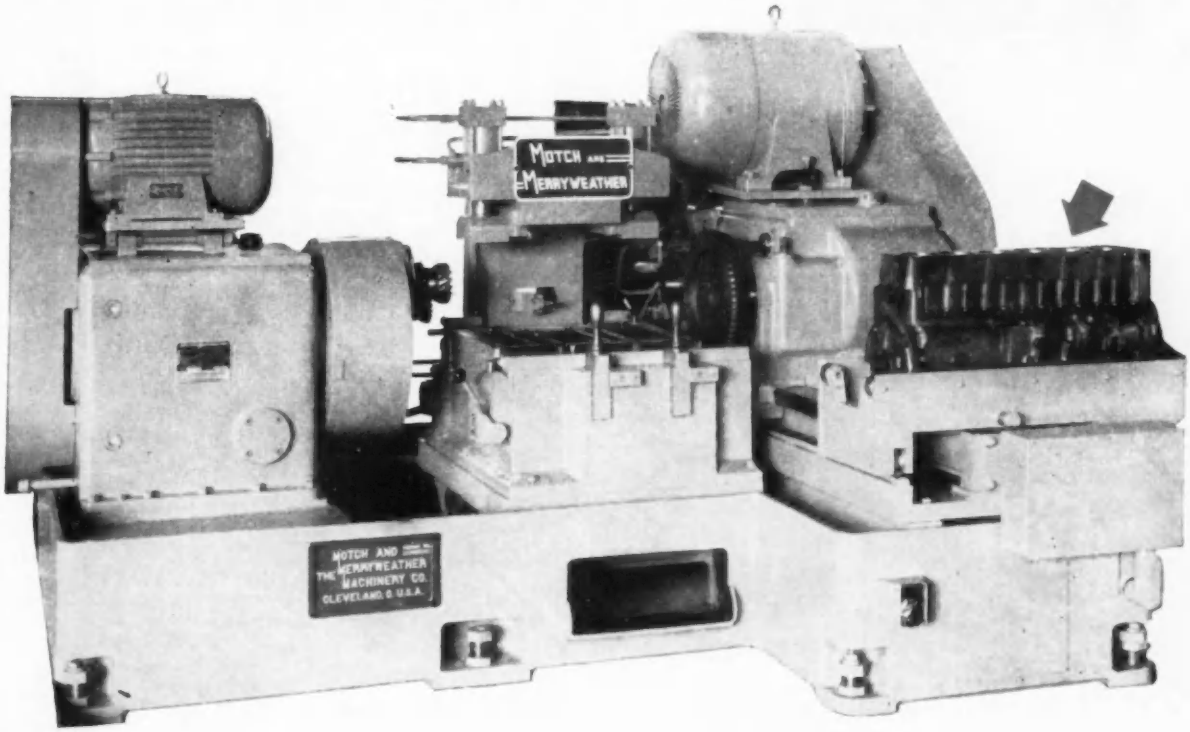
Consolidated Electrodynamics Corp. has established a new Spectron Div. for the design, development, and manufacture of high-quality precision optics.

* * *

Battelle Memorial Institute has developed a new type of electrically conductive film for aircraft windshields. It may in the future be adapted to automobiles and trucks to keep windshields free from ice and fog.

(*Turn to page* 188, *please*)

M&M develops another specialized machine



Special Duplex Milling Machine

more than doubles milling production on cylinder blocks

A prominent automotive manufacturer—comparing this M&M machine with previous equipment used to mill ends of cylinder blocks—reports:

In addition to boosting production from 22 to 50 blocks per hour, this M&M machine has greater strength in planetary milling unit, gives longer cutter life and more accuracy. Its extreme rigidity permits rough and finish operations in one pass of the heads.

An operator positions the block in the fixture where it is automatically clamped. The right hand head feeds across one end of the block while the left hand planetary head profiles the flywheel housing mounting surface. Cutters rapid traverse back, fixture is unclamped and finished block is removed.

Machine Tool Manufacturing Division

MOTCH AND MERRYWEATHER

Cleveland, Ohio

AI TABLOID

(*Continued from page* 186)

Structural Fibers, Inc., has moved from Bedford, Ohio, to Chardon, O.

Vertol Aircraft Corp. has developed four new improvements, three of them contributing to increased stabilization, for its H-21 helicopter.

* * *

Gray Iron Founders' Society has launched a new design contest running until Aug. 20, 1957.

* * *

Seaboard Pacific Div. of Associated Spring Corp. has opened a new sales office in Saratoga, Calif. . . . Clevite Corp. has opened new sales office in Van Nuys, Calif.

Clark Equipment has set up a factory sales and service branch at 712 11th Ave., New York, N. Y.

* * *

General Electric Co. plans construction of a new product and process development laboratory and further expansion of other facilities at its Silicone Products Dept. in Waterford, N. Y.

* * *

Amphenol Electronics Corp. has organized a new subsidiary, Amphenol Great Britain Ltd., which will manufacture and sell the entire line of Amphenol products.

* * *

Simplex Engineering Co., Inc., and Racine Hydraulics & Machinery, Inc., have negotiated a merger, involving a transfer of stock.

* * *

Ryan Aeronautical Co. has received a $1.5 million contract to supply new self-contained, lightweight automatic navigators for use in Army aircraft.

* * *

Sparta Mfg. Co. is name of new firm organized in Sparta, Wis., to produce cylinder sleeves . . . Sanford Custom Moulding, Inc. is name of new company formed in Springvale, Me., to produce custom-molded plastic products for the automotive, footwear, and electronic industries.

* * *

Purdue Univ. has established a permanent Thermophysical Properties Research Center.

* * *

Chambersburg Engineering Co. has appointed Riordan Machinery Co., Detroit, Mich., as exclusive representatives in Eastern Michigan and in the Toledo and Fort Wayne areas.

* * *

Massachusetts Institute of Technology will conduct a course on precision investment castings from Sept. 9-13.

* * *

Lockheed, Aircraft Corp. has received a "go-ahead" contract from the Navy for pre-production work on a new saucer-domed radar plane with prop-jet power.

* * *

Kingsbury Machine Tool Corp. has appointed Birmingham & Conner Machinery Co., 19425 West McNichols Rd., Detroit, Mich. as its exclusive representatives in Eastern Michigan.

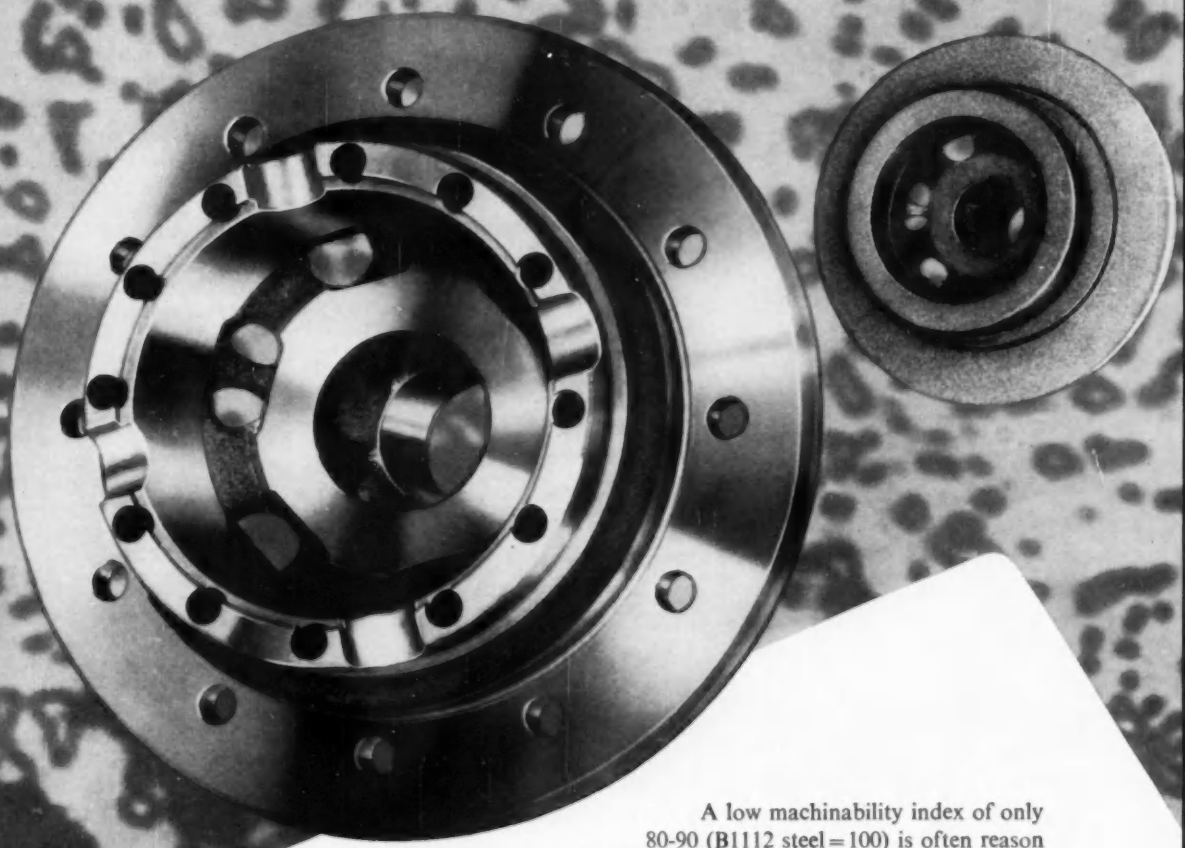
* * *

Crucible Steel Co. of America has opened its expanded specialty steel warehouse at 4501 West Cortland St., Chicago, Ill.

* * *

it's only part of the HTM story...*

MACHINABILITY



A low machinability index of only 80-90 (B1112 steel = 100) is often reason enough to specify HTM for your product.

But HTM castings don't stop there. Other "plus" advantages are high ultimate strength . . . resistance to wear under heavy loads and at high speeds . . . excellent non-seizing properties. In addition, they can be air or liquid quenched . . . can be smooth finished.

Don't overlook the many advantages of HTM metal. It can increase the performance and saleability of your product.

AA-3698

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY

Established 1868 • Cleveland 6, Ohio

The nation's largest independent producer of malleable and pearlitic malleable

*Hi-Tensile (Heat-Treated) Malleable

**HTM-228 metal, liquid quenched, x2000, etched

MEN *in the* NEWS

(*Continued from page* 104)

Du Pont Co., Fabrics and Finishes Dept.—**John W. Richardson** has been appointed manager of automotive sales of coated fabrics.

Michigan Tool Co., Gear-O-Mation Div. — **Felix Zawaski** is now plant manager.

Ford Div., Ford Motor Co.—**Joseph A. Richardson** has been named plant manager of the new Ford assembly plant at Lorain, O.

Chrysler Corp.—**Edward P. Tighe** has been named manager of the general and administrative budget department, and **Joseph E. Consolmagno** is now manager of public relations services.

Westinghouse Air Brake Co., Le Roi Div.—**Albert Feucht** has been appointed manager of the Cleveland plant, and **Donald M. McDowell**, manager of engineering for the division.

Goodyear Tire & Rubber Co.—**Richard V. Thomas** has been named assistant to the executive vice-president of production, and **Marshall F. Gillespie** succeeds him as plant manager of the Los Angeles plant.

General Motors Acceptance Corp.—**Thomas W. Towell** has been elected vice-president in charge of the development staff, and **Warren H. Wilson** succeeds him as vice-president in charge of branch operations in the eastern half of the U. S.

Olin Mathieson International Corp.—**Alfred T. Zodda** has been appointed vice-president—operations.

Eclipse Machine Div., Bendix Aviation Corp.—**Nelson H. Mageoch** has been promoted to assistant general manager; **Joseph W. Poliseo**, chief engineer of a new Electronics Engineering Dept.; **James W. Mason**, assistant factory manager; and **Robert W. Sutton**, assistant chief engineer of the Electronics Engineering Dept.

Whitehead Metal Products Co.—**Edward W. Lothman** has been elected a director; **Richard W. Nuffort**, secretary; **Frank A. Fink**, treasurer; and **John W. Bonnet**, administrative assistant to the president, and assistant secretary.

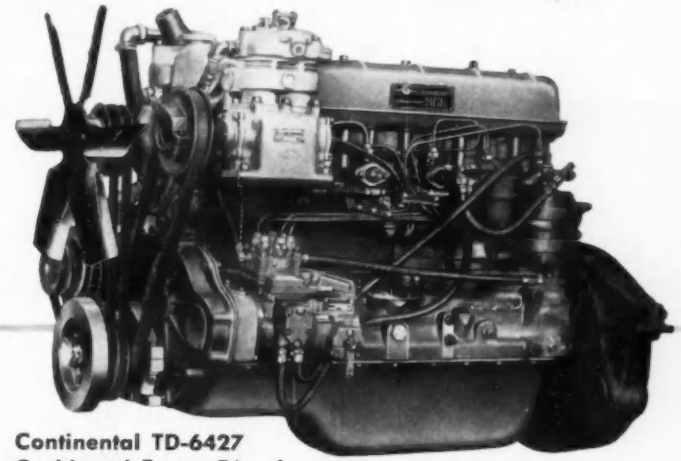
ACF Industries, Inc., Avion Div.—**John A. Curtis** has been named sales manager.

Ohio Crankshaft Co., Tocco Div.—**John F. Cachat** was made works manager.

(*Turn to page* 192, *please*)

*Hi-Tensile (Heat-Treated) Malleable **HTM-228 metal, liquid quenched, x2000, etched

Cushioned® Power IS THRIFTY POWER



Continental TD-6427
Cushioned Power Diesel

TRANSPORTATION DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
TD6427	6	4 5/16	4 1/8	427	116.0 @ 2400 RPM
RD6572	6	4 1/4	5 1/8	572	172.0 @ 2400 RPM
VD8603	8	4 3/4	4 1/4	603	182.0 @ 2800 RPM
SD6802	6	5 5/16	5 1/2	802	225.0 @ 2200 RPM

TRANSPORTATION GASOLINE ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N4062	4	2 1/8	3 1/2	62	26.3 @ 3500 RPM
Y4069	4	2 1/2	3 1/2	69	28.0 @ 3500 RPM
Y4091	4	2 7/8	3 1/2	91	36.0 @ 3400 RPM
F4124	4	3	4 1/8	124	47.0 @ 3200 RPM
F4140	4	3 1/16	4 1/8	140	52.0 @ 3200 RPM
F4162	4	3 7/16	4 1/8	162	58.0 @ 3200 RPM
F6186	6	3	4 1/8	186	77.0 @ 3500 RPM
F6209	6	3 1/16	4 1/8	209	90.0 @ 3500 RPM
F6226	6	3 5/16	4 1/8	226	98.8 @ 3500 RPM
F6244	6	3 7/16	4 1/8	244	105.0 @ 3750 RPM
M6271	6	3 5/8	4 1/8	271	96.5 @ 3000 RPM
M6290	6	3 3/4	4 1/8	290	108.0 @ 3000 RPM
M6330	6	4	4 1/8	330	125.0 @ 3000 RPM
M6363	6	4	4 13/16	363	146.0 @ 3000 RPM
B6371	6	4 1/8	4 5/8	371	123.5 @ 3000 RPM
B6427	6	4 5/16	4 1/8	427	142.0 @ 3000 RPM
K6271	6	3 5/8	4 1/8	271	114.5 @ 3200 RPM
K6290	6	3 3/4	4 1/8	290	123.0 @ 3200 RPM
K6330	6	4	4 1/8	330	147.0 @ 3200 RPM
K6363	6	4	4 13/16	363	162.0 @ 3200 RPM
T6371	6	4 1/8	4 5/8	371	143.8 @ 3000 RPM
T6427	6	4 5/16	4 1/8	427	170.0 @ 3000 RPM
U6501	6	4 1/2	5 1/4	501	178.0 @ 2600 RPM
R6513	6	4 1/2	5 1/8	513	192.2 @ 2800 RPM
R6572	6	4 1/4	5 1/8	572	220.0 @ 2800 RPM
R6602	6	4 1/8	5 1/8	602	232.0 @ 2800 RPM
S6749	6	5 1/8	5 1/2	749	250.0 @ 2800 RPM
S6820	6	5 5/8	5 1/2	820	275.0 @ 2800 RPM
V8603	8	4 3/4	4 1/4	603	240.0 @ 3200 RPM

A tip from fleet operators who have switched to Continental Diesel: When you're ready to "go Diesel," it pays, in more ways than just initial cost, to go the whole distance and get exclusive Red Seal Cushioned Power. In that way, you obtain fullest measure of ALL the advantages identified with engines of Diesel type. You use less fuel than with conventional Diesels. You have more cargo capacity because you're lugging less engine weight. And the wide interchangeability of parts between Cushioned Power Diesels and companion models in the Red Seal gasoline engine line expedites maintenance and sharply reduces parts cost.

•

AUTHORIZED SERVICE
and genuine Red Seal parts available from coast to coast.

CONTINENTAL MOTORS ® Powerful as the Nation AMERICA'S STANDARD

Continental Motors Corporation
MUSKEGON, MICHIGAN

WORLD'S LEADING INDEPENDENT MANUFACTURER OF INTERNAL COMBUSTION ENGINES, CONTINENTAL MOTORS OPERATES PLANTS IN ATLANTA, DALLAS, DETROIT, MILWAUKEE, MUSKEGON, AND TOLEDO, AND IN ST. THOMAS, ONT., PRODUCING AIR-COOLED AND LIQUID-COOLED ENGINES FOR USE ON LAND, AT SEA AND IN THE AIR.

MEN *in the* NEWS

(*Continued from page* 190)

Fairbanks, Morse & Co.—**Robert H. Morse, Jr.,** was named president and chief executive officer; **Gordon R. Anderson,** vice-president, engineering; **F. M. Mason, Jr.,** vice-president, Government business; **Robert Brown,** secretary and assistant treasurer; **R. E. Whiteley,** assistant secretary; **Robert H. Morse, III,** vice-president in charge of budgets and planning; **V. H. Peterson,** vice-president in charge of sales; **John A. Cuneo,** vice-president in charge of foreign operations; **John C. Elmburg,** general sales manager, and **G. R. Anderson,** chief engineer.

Minnesota Mining & Mfg. Co.—**Robert H. Tucker** and **Irwin R. Hansen** have been elected secretary and treasurer, respectively.

Westinghouse Electric Corp.—**R. D. Rowley** has been named manager of the metals plant at Blairsville, Pa.

Boeing Airplane Co. — **George S. Schairer** was appointed director of research.

Libby-Owens-Ford Glass Co.—**Donald W. Dunipace** has been named director of development.

Nylok Corp. — **Paul Garrett** and **David F. Austin** were elected directors.

C. M. Hall Lamp Co.—**Herbert K. Lewis** has been named public relations director.

Electric Auto-Lite Co., Syracuse Div.—**J. B. Franklin** has been chosen manager.

Canadair, Ltd. — **Dean P. Stowell** has been appointed vice-president of manufacturing.

Pittsburgh Plate Glass Co., Glass Div.—**Robinson F. Barker** has become vice-president.

Joseph T. Ryerson & Son, Inc.—**Clive C. Earle** was made sales manager of the Buffalo plant.

Temco Aircraft Corp. — **W. A. Tweedie** has been named manager of programming.

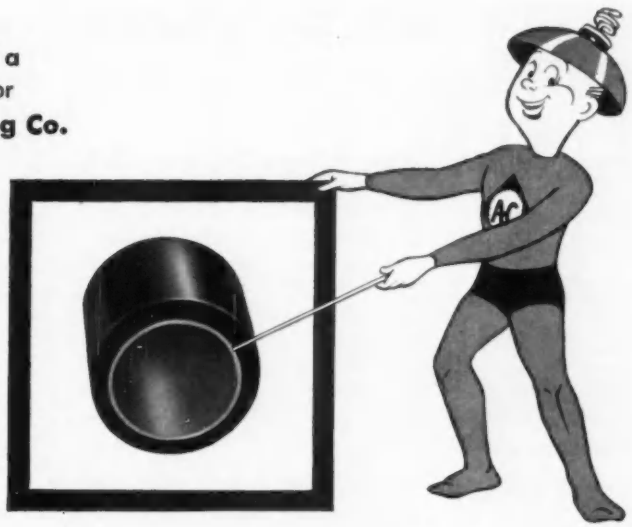
Automation Industries, Inc.—**James J. Wilder** has become general manager.

H. A. King Co.—**Harold F. Peirce** is now chief engineer, design, research, and development of functional mechanical rubber units.

Detroit Harvester Co.—**Peter H. Haller** is now assistant sales manager of automotive sales.

(*Turn to page* 194, *please*)

Mr. Hi Frequency does a
Surface Hardening Job for
Jambor Tool and Stamping Co.



Boosts Bolt Sales 300%

White line indicates hardened steel. A uniform case depth of .060 with Rockwell hardness of 60 to 62 is obtained. (Black wrapper was used in photo to emphasize hardened area.)

Jambor had trouble. They were making a top-grade king bolt with excellent wearing qualities, but it had one little drawback — *it was "file soft."*

Mr. Hi Frequency to the Rescue

To remedy the situation, Jambor switched to a higher carbon steel and surface-hardened the bolts with Allis-Chalmers electronic induction heaters. Mr. Hi Frequency's rapid and selective method of surface hardening produced amazing results. Sales went up a whopping 300%. Material costs dropped 10%.

It could happen to you. If your job is one of hardening, annealing, soldering, brazing or melting, it will pay you to consider Allis-Chalmers induction heating. Chances are this most advanced method of applying heat will boost your production, decrease costs and improve quality just as it has in hundreds of applications. For complete information, see your A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

Jambor uses a 20-kv Allis-Chalmers induction heater. The work coil and quenching ring were specially designed for the specific job by Allis-Chalmers.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

A-5432

MEN *in the* NEWS

(*Continued from page* 192)

Firestone Tire & Rubber Co.—**E. B. Hathaway** has been elected vice-president in charge of trade sales.

Lincoln Engineering Co.—**Jonathan Kludt** has been elected executive vice-president and general manager.

Bendix Products Div., Bendix Aviation Corp.—**Stanley B. Smith, Jr.,** is now sales manager of aircraft engine equipment.

Joseph T. Ryerson & Son, Inc.—**James E. Burke** is now manager of alloy and stainless steel sales at the Pittsburgh steel service plant.

Fenestra, Inc., Detroit Steel Products Div.—**David S. Burnett** was made vice-president and general manager.

Baldwin - Lima - Hamilton Corp. —**Perry A. White** has been made vice-president and general manager of the Eddystone Div.; **Robert G. Tabors,** vice-president and general manager of the Electronics & Instrumentation Div.; and **Robert P. Bauer,** general controller.

Goodyear Tire & Rubber Co., Service Sales and Equipment Div.—**James A. Nelson** was named manager of equipment sales, and **G. P. White** was made manager of retread production and merchandising.

AC Spark Plug Div., General Motors Corp.—**James V. Lecocq** is now public relations manager for the Milwaukee plants.

Sterling Precision Corp.—**James F. Connaughton** has been elected president and chief executive officer.

La Salle Steel Co.—**Andrew L. Rowe** has been made assistant to the president, and **Thomas J. Moore, Jr.,** was promoted to director of product planning and diversification.

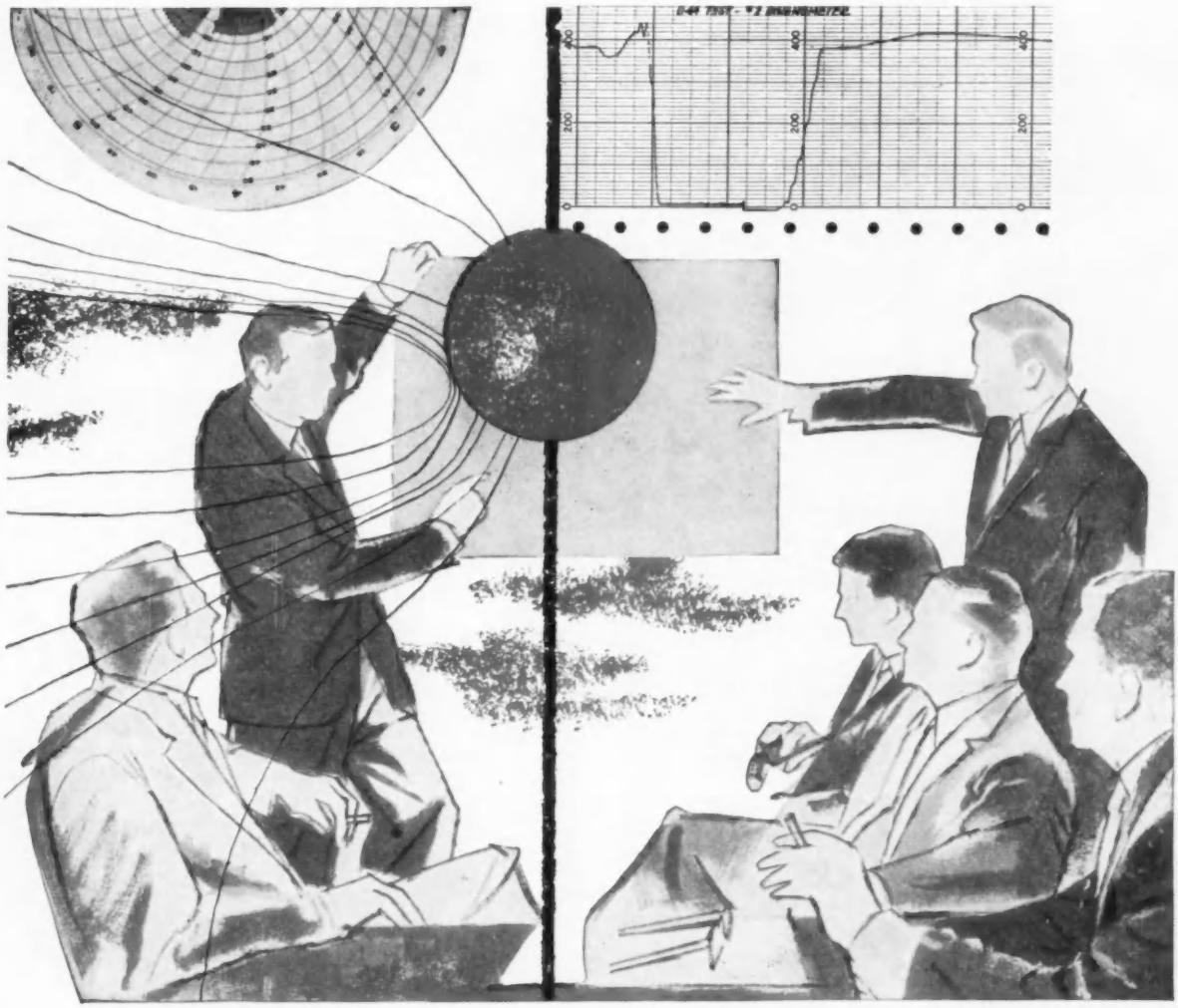
Glenn L. Martin Co.—**William A. Burns, Jr.,** has been elected to the board of directors.

Yale Materials Handling Div., Yale & Towne Manufacturing Co.—**Harold M. Stiles** has been made western regional sales manager.

National Lead Co., Titanium Div. —**Joseph H. Reid** has been appointed general manager, and **Graham W. Corddry** has been named manager.

La Salle Steel Co.—**E. A. Hoffman** is now manager of industrial analysis in the Research and Development Dept.

(*Turn to page* 196, *please*)



For either STOP or GO engineering . . .
add an American Brakeblok friction specialist to your team

TYPICAL FRICTION MATERIALS

Asbestos Based. All types of molded friction materials, including light- and heavy-duty brake linings and thick blocks, clutch facings and special products for industry.

Sintered Metal. Sintermet — sintered metallic friction materials for transmission and clutch applications in the automotive, aircraft and industrial fields.

The costly experimental work your company is planning for next month or next year may already have been done by American Brakeblok.

In one sentence, that's why it pays to call in an American Brakeblok friction specialist when considering friction material requirements. These specialists have broad experience in the use of friction materials and can often judge from their own experience which materials will or won't do the job. American Brakeblok laboratory facilities are ready to test and confirm every recommendation. For prompt service, write or phone American Brakeblok today.

American Brakeblok
REG U.S. PAT. OFF.

Brake Shoe

AMERICAN BRAKEBLOK DIVISION
DETROIT 9, MICHIGAN

MEN *in the* NEWS

(*Continued from page* 194)

Clark Equipment Co.—**George Turner** and **Bert M. Walter** were elected vice-presidents.

Electric Storage Battery Co.—**Ray M. Stadick** was made general traffic manager.

Willys-Overland Export Corp.—**E. L. Anderson** has been appointed merchandising manager.

American Bosch Div., American Bosch Arma Corp.—**Joseph C. Johnson** is now assistant manager-engineering in charge of the Advanced Engineering Section.

Minnesota Mining & Mfg. Co.—**Joseph C. Duke** and **Bert S. Cross** were elected to the board of directors.

Dana Corp., Pottstown Div.—**A. L. Dyer, Jr.,** has been made superintendent of the new Aircraft Dept.

Rollway Bearing Co.—**H. Follett Hodgkins, Jr.,** was made assistant general manager.

Bell Aircraft Corp.—**William G. Gisel** was elected a vice-president; **Mason O. Damon,** secretary; and **Norton C. Willcox,** controller.

Norton Co., Abrasive Div.—**Paul L. Lantz** has been appointed production manager.

Elastic Stop Nut Corp., A'G'A Div.—**W. Douglas Wilson** and **Herbert G. Bostrom** were made product development engineers in charge of the Agastat Research and Development Dept.

Minneapolis-Honeywell Regulator Co.—**R. L. Mallory** has been promoted to manager of the Southwestern sales region.

Joseph T. Ryerson & Son, Inc.—**Harry A. Zahn** is now manager of alloy steel sales at the Philadelphia steel service plant.

Lockheed Aircraft Corp.—**John E. Canaday** was elected vice-president in charge of public relations.

Brown-Lipe-Chapin Div., General Motors Corp.—**Stanford Landell** is now works manager; **Wayne A. Smith,** director of sales and product engineering; **John B. Findling,** plant manager; and **William I. Shover,** director of production engineering.

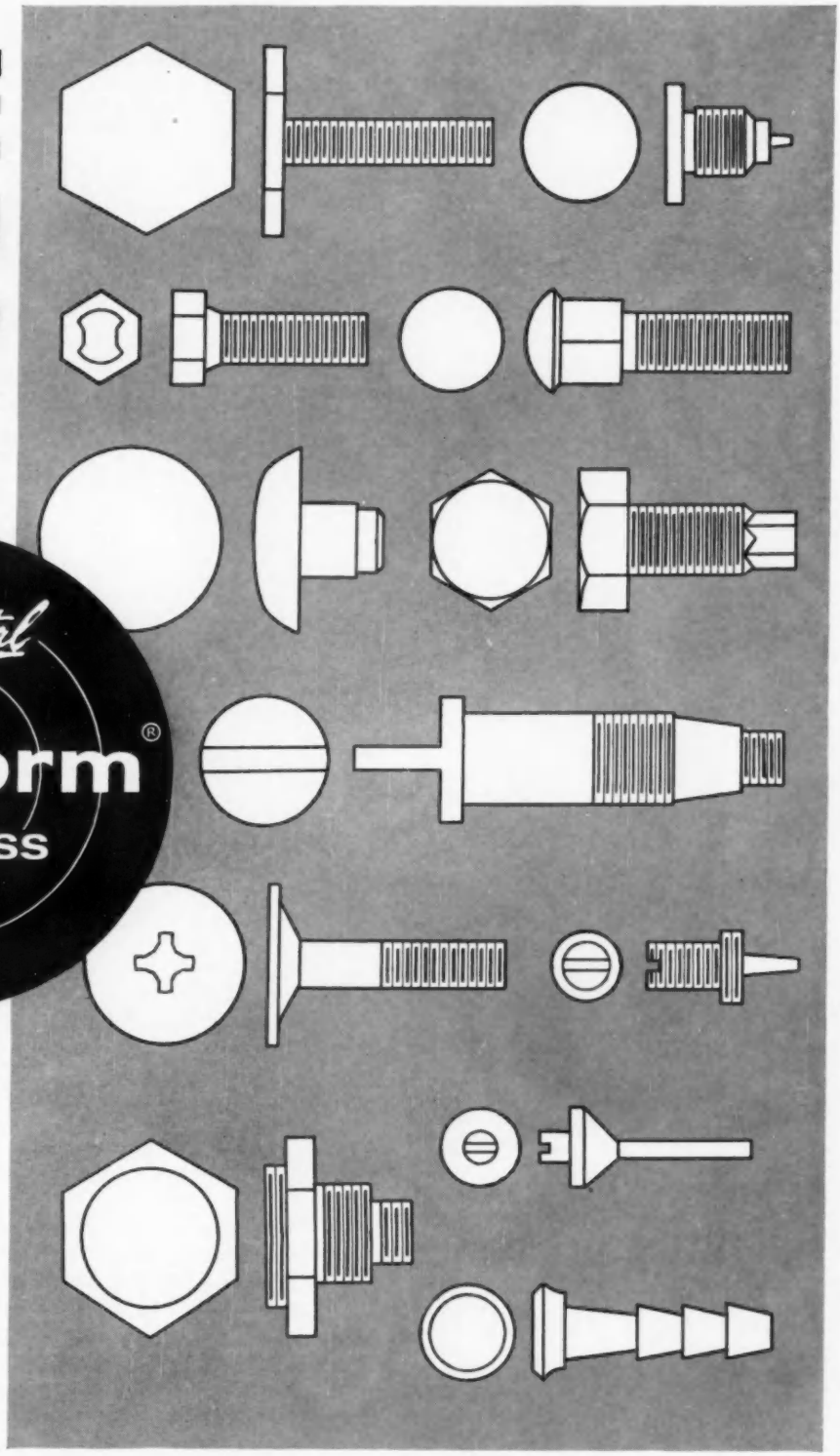
Aeroquip Corp.—**Victor F. Kent** was named assistant advertising manager in charge of sales promotion, and **John L. Pederson** was made purchasing agent for the Industrial Div.

Clearing Machine Corp.—**Ted Goeller** has been promoted to assistant sales manager in charge of all Dealer Contracts.

Extending high production advantages to an

unlimited new range

of specifications in fasteners and allied products



Continental Co-form® PROCESS

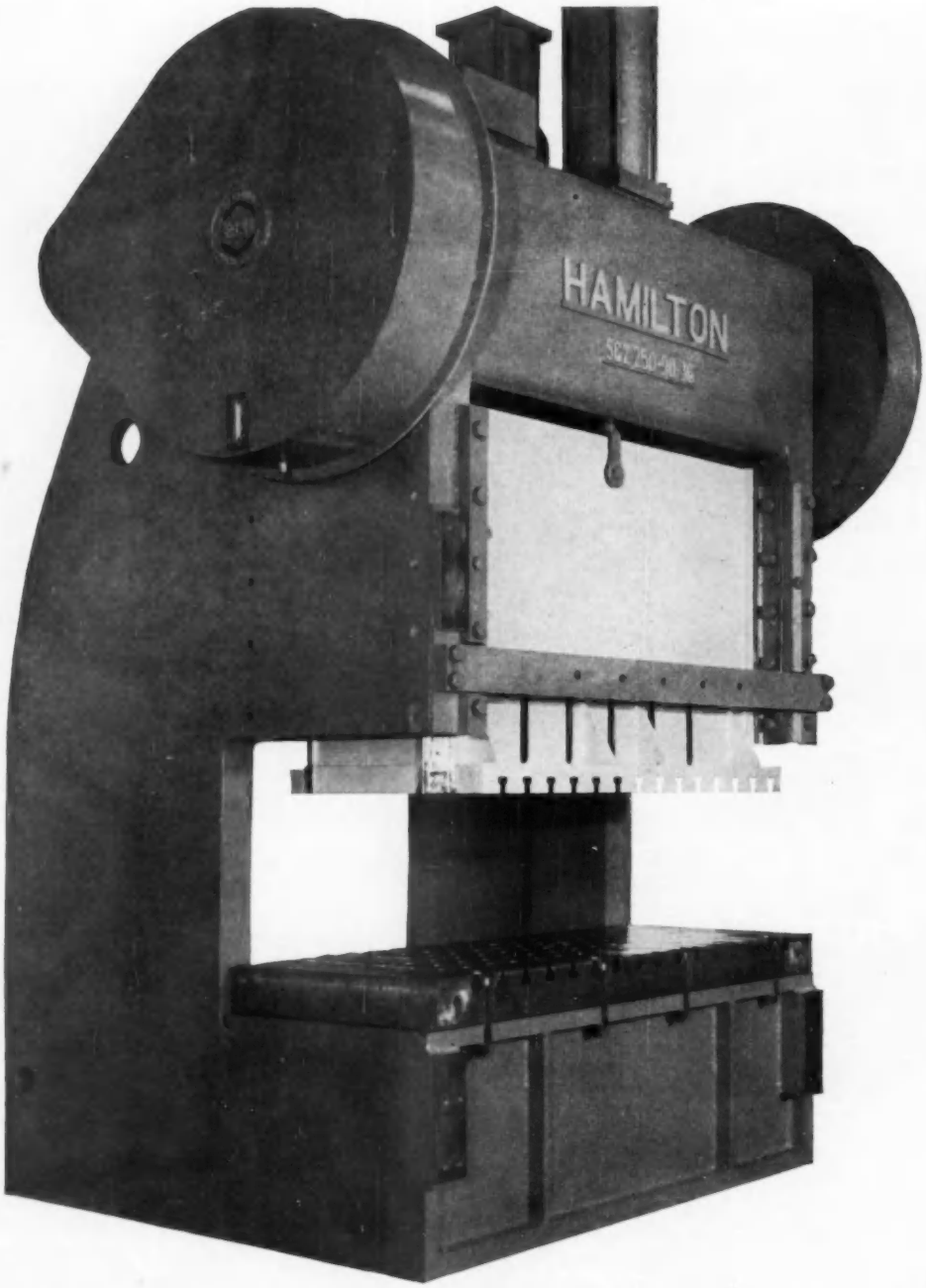
If you use machined parts like these, — the *new* Continental CO-FORM Process offers you unlimited benefits in design simplification, production speed, dimensional precision, improved product strength, and sharp, clean contours. For full information, write: Continental Screw Co., 451 Mt. Pleasant St., New Bedford, Mass.

CONTINENTAL

SCREW COMPANY • NEW BEDFORD, MASS.

HOLTITE FASTENERS

MEMBER SCREW RESEARCH ASSOCIATION



Hamilton press line expanded to include medium size presses

Pictured above is a new Hamilton Gap Press recently installed at the Eaton Manufacturing Company, Cleveland, Ohio. This new large-bed press stamps out the larger grille guards which the latest model cars are calling for.

The capacity of this press is 250 tons and the speed 28 to 30 strokes per minute. Bed area is 90 in. right to left; 36 in. front to back. It is one of a new line of single and double-crank presses ranging from 100-300 tons capacity.

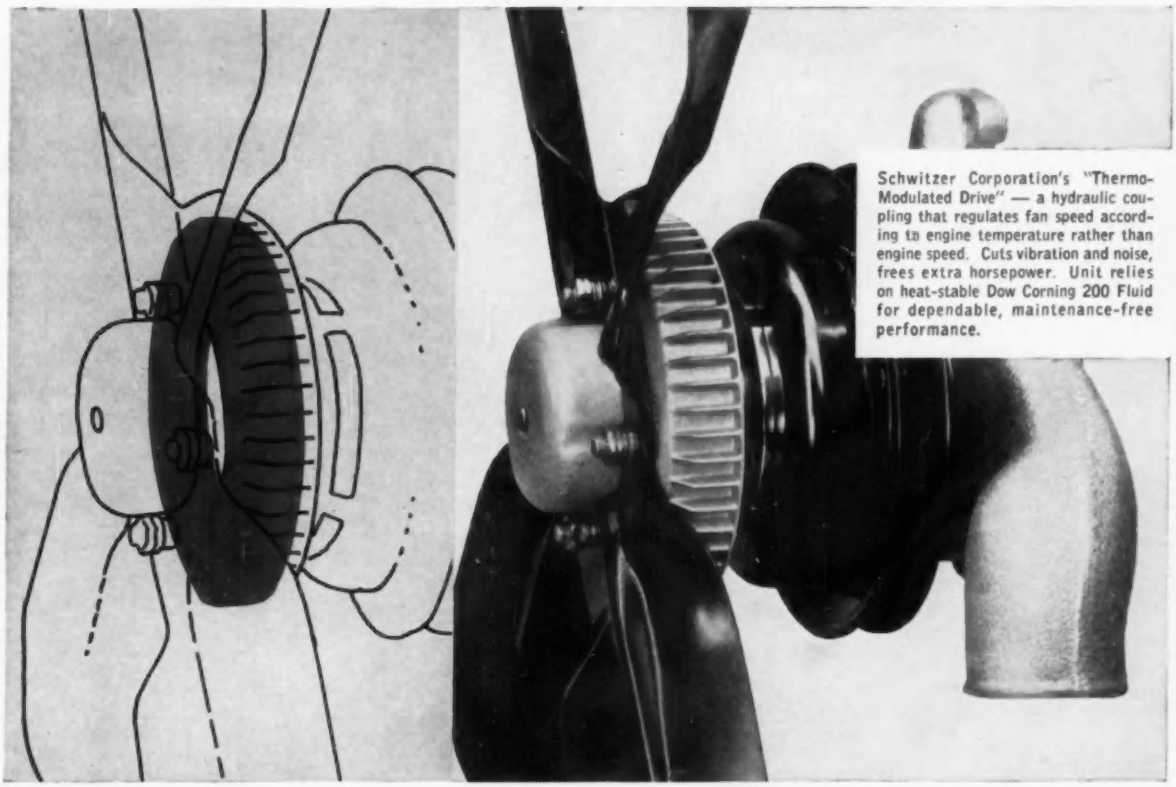
Write to Hamilton Division, B-L-H Corporation, for full information and specifications on this new line of heavy duty Hamilton presses.

Hamilton Division Hamilton, Ohio

BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools

BALDWIN BLH LIMA-HAMILTON



Schwitzer Corporation's "Thermo-Modulated Drive" — a hydraulic coupling that regulates fan speed according to engine temperature rather than engine speed. Cuts vibration and noise, frees extra horsepower. Unit relies on heat-stable Dow Corning 200 Fluid for dependable, maintenance-free performance.

Dow Corning Silicone Fluids

break the THERMAL BARRIER!

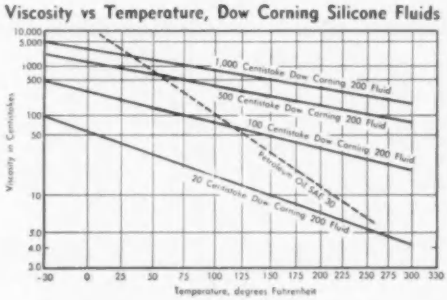
Whether it's your current design or an idea still in the development stage — if practical application is limited by problems of thermal stability, there's a good chance you'll find a solution in Dow Corning 200 Fluids.

These inherently heat-stable silicone fluids maintain near constant viscosity and damping force over broad spans of temperature and time. Highly resistant to oxidation and permanent shear break-down, they are serviceable from —40 to 400 F.

Among today's many successful applications for 200 Fluid in the automotive industry are crankshaft vibration dampers, hydraulic couplings, dashboard instruments, dashpots, pneumatic springs and truck scales. How about *your* application?

Technical assistance in applying Dow Corning 200 Fluids is yours for the asking with no obligation, of course.

Viscosity vs Temperature, Dow Corning Silicone Fluids

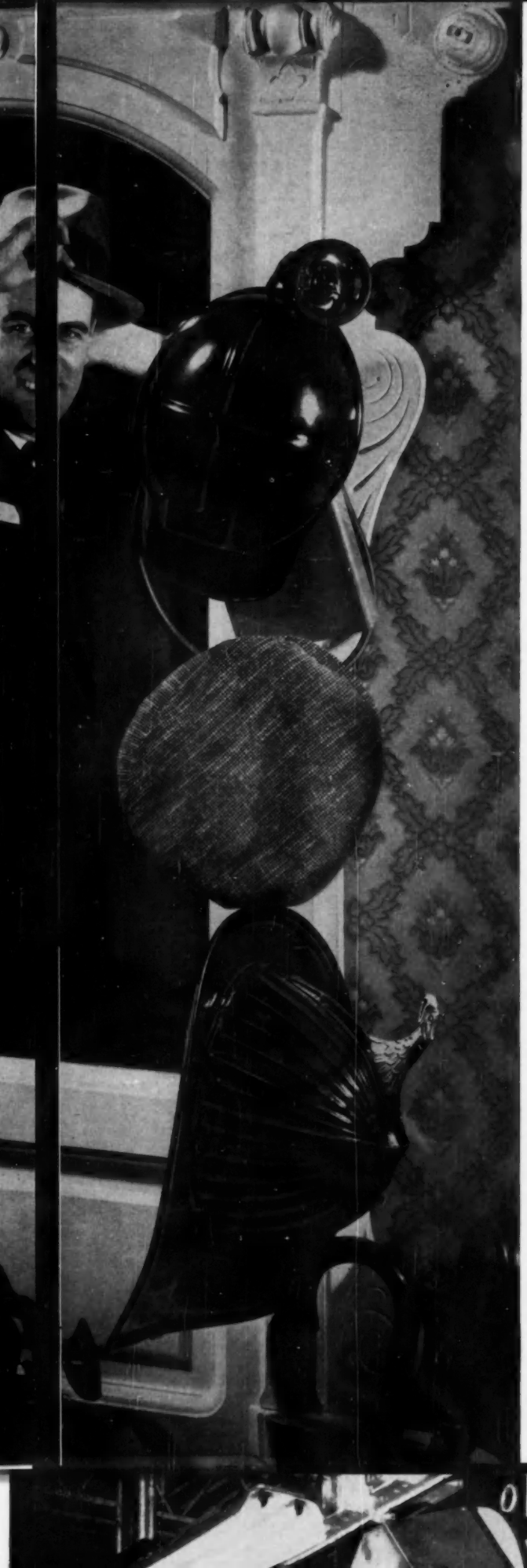


Get this FREE BOOKLET
on Dow Corning 200 Fluids — gives complete data on properties, performance, applications. Write Dept. 0619.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D.C.



How many hats do you wear?

IT HAS BEEN SAID that a product design engineer must wear many different hats. First of all, he has to think out a gadget that will do a certain job without falling apart. Then, he has to be a production expert because he has to be sure that his gadget can be *made*. Can it be made economically? He has to know some cost accounting. Has he specified screwball component parts? He has to know a lot about purchasing—what materials are available, when they can be delivered and all the rest.

Since most machines contain some springs, your design engineer should (ideally) also be a spring engineer. But don't you have to draw the line somewhere? The most skilled group of spring engineers in the nation are at your beck and call without any obligation. The men at American Steel & Wire have been specialists all their lives. A problem that is new to you may be old hat to them. More than that, they know spring-making *machinery*, and can suggest design modifications that will allow more efficient production methods. Result? Lower cost for you.

Like they say in the ads, no order is too small or too large. Just call your AS&W representative.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO,
PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.,
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN *QUALITY* SPRINGS

UNITED STATES STEEL

USS

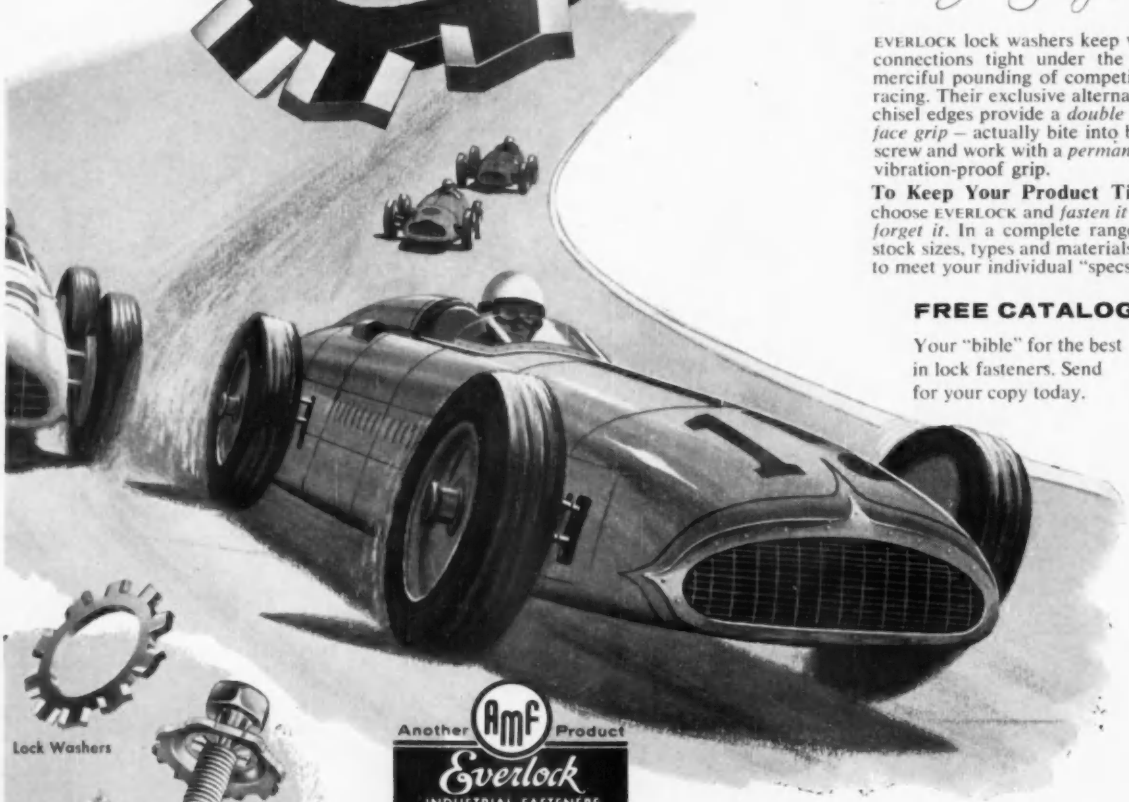
TIGHT *and* SECURE

Through 200 laps at speeds to 180 mph in the Indianapolis "500 Mile Classic"

thanks to

Everlock®

INDUSTRIAL FASTENERS



Another AMF Product
Everlock
INDUSTRIAL FASTENERS

THOMPSON-BREMER & CO.
512 North Dearborn Street • Chicago 10, Illinois
Subsidary of AMERICAN MACHINE & FOUNDRY CO.

1st—SAM HANKS
"A car has to hold together to win the checkered flag. That's why the cars I race are held together with Everlock lock washers. They go a long way toward eliminating mechanical failure."

2nd—JIM RATHMANN
"With cars getting lighter and faster all the time, chassis really take a beating. That's why Everlock lock washers are standard on the cars I drive. They prevent looseness in chassis, running gear and body."

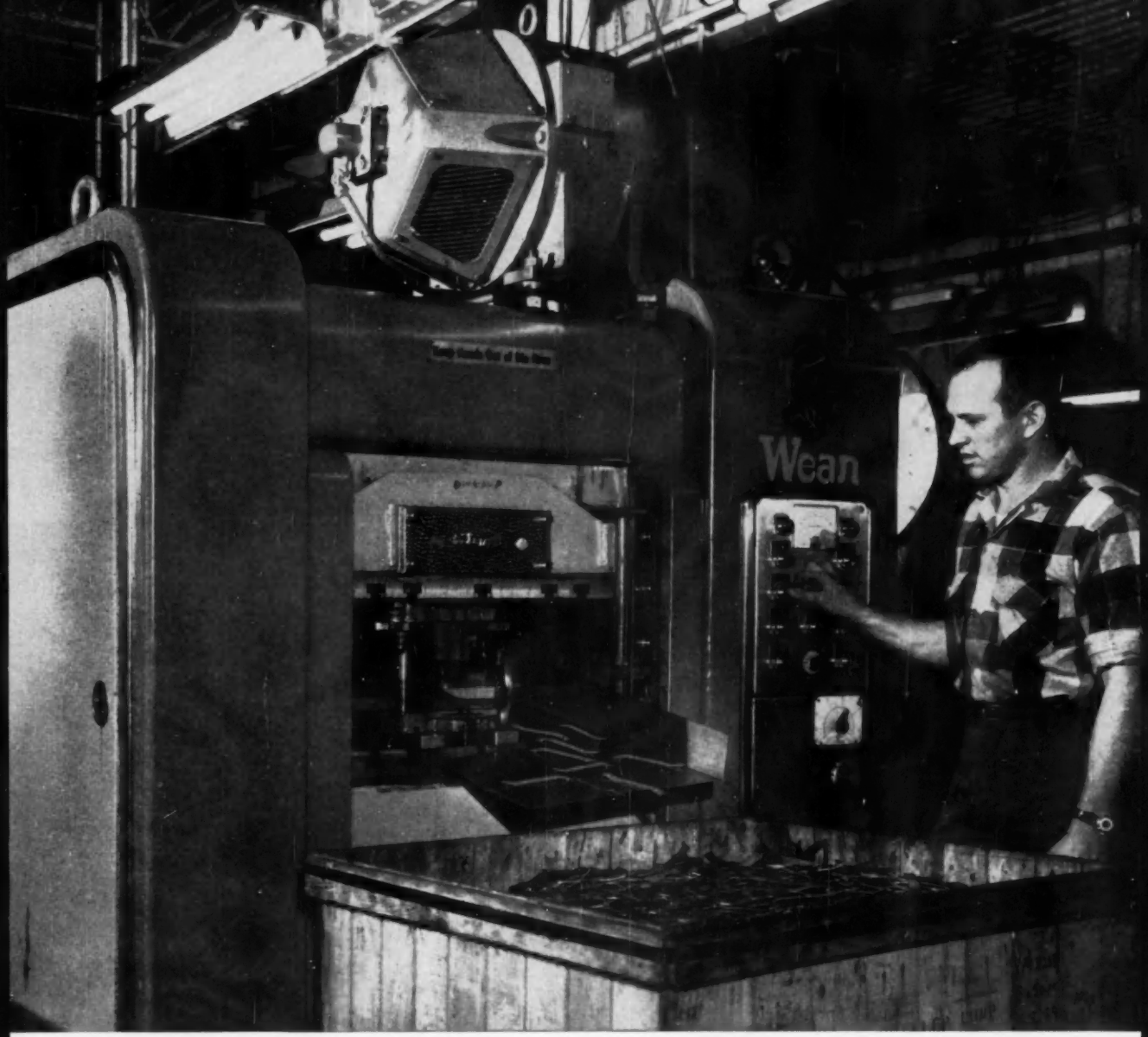
3rd—JIMMY BRYAN
"The 500 is the nation's toughest test of drivers and cars. Everlock lock washers held tight throughout the entire contest and helped give confidence in the car."

EVERLOCK lock washers keep vital connections tight under the unmerciful pounding of competitive racing. Their exclusive alternating chisel edges provide a *double surface grip* – actually bite into both screw and work with a *permanent*, vibration-proof grip.

To Keep Your Product Tight choose EVERLOCK and *fasten it* and *forget it*. In a complete range of stock sizes, types and materials, or to meet your individual "specs."

FREE CATALOG

Your "bible" for the best in lock fasteners. Send for your copy today.



Is the Wean "Flying Press"

the fastest press in the world?

WE THINK IT IS. While our top speeds have stayed around 600 strokes per minute on the "flying press," the size of piece is not restricted to washers and the like which are made on other high speed presses.

For example, where conventional presses rarely can process more than 100 feet of metal per minute, the "flying press" has performed at speeds in excess of 300 feet per minute.

One new model, for instance, blanks automotive assemblies 8 feet long at 45 per minute.

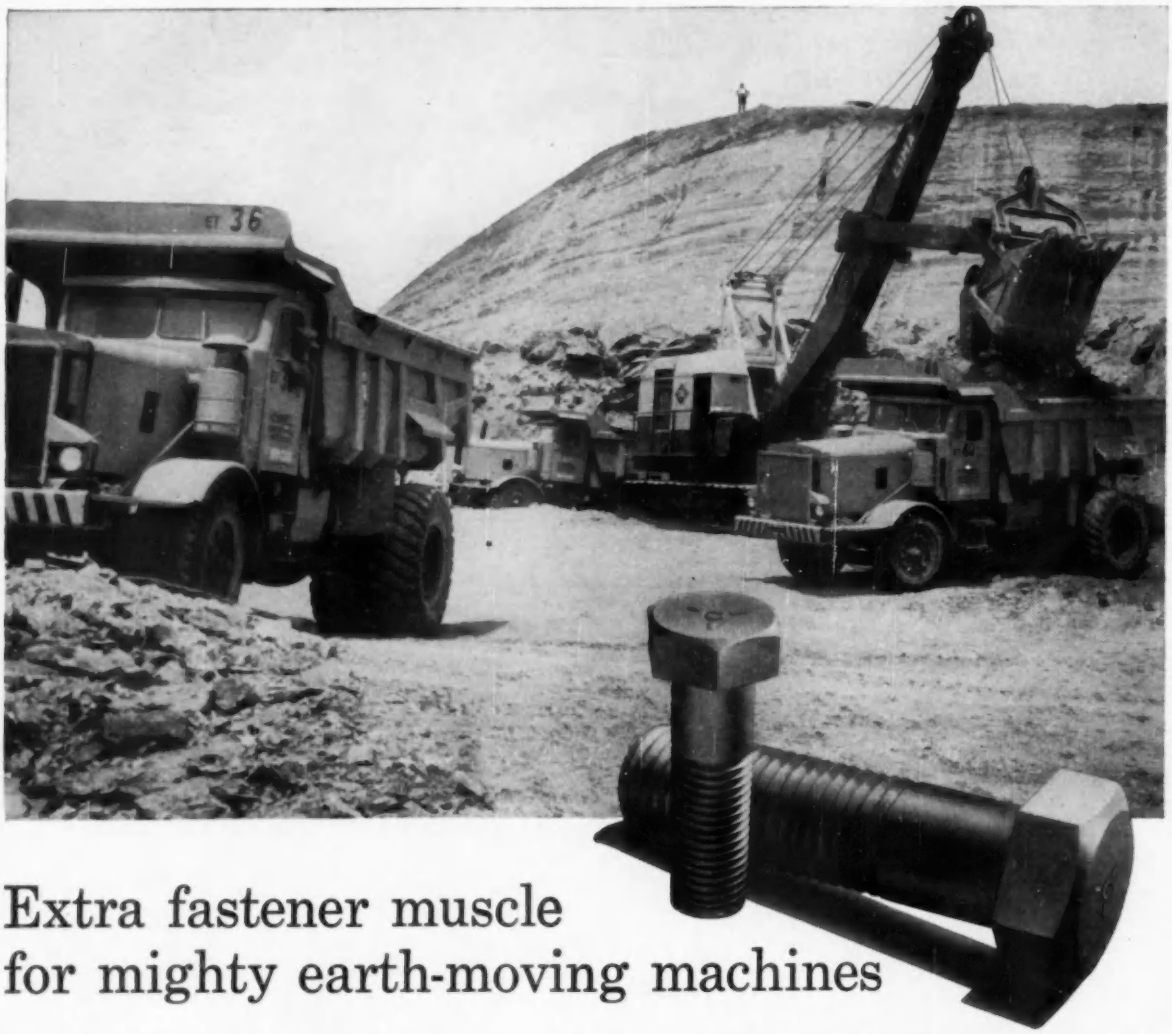
Yet, the "flying press" has other major advantages for you. Despite its revolutionary construction, it requires up to 20% less maintenance than other presses — it has no brake or clutch to wear. And, because of almost perfect dynamic balance, the press can be floor mounted.

We could write a book about the features of the Wean "flying press" — in fact we have. It's soon to be released . . . and it's yours for the asking. Write to the address below. We will mail your copy of the Wean "Flying Press" brochure as soon as it comes from the printers.

Wean Equipment Corporation

CLEVELAND 17, OHIO

CLEVELAND STANDARD HEXAGON HEAD CAP SCREWS



Extra fastener muscle for mighty earth-moving machines

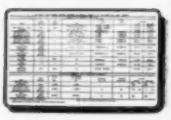
Power shovels, trucks, bulldozers—all take brutal shock loads and vibration, day in, day out. To reduce repairs and down-time to a minimum, leading manufacturers of earth-moving equipment specify Cleveland cap screws with confidence. These upset forged hexagon head cap screws put extra strength into every assembly, insure customer satisfaction.

Cleveland standard hexagon heads are manufactured from various steels and in various tensile strengths. Included are extra-large diameters and long lengths. Bright and quenched and tempered steels in all standard sizes are ready for immediate delivery—alloy steels on short notice. Let our experienced engineers help you with your fastener problems. Remember, Cleveland has the most modern of production facilities and the world's largest stock of hexagon head cap screws.

TENSILE STRENGTHS OF CLEVELAND HEXAGON HEAD CAP SCREWS

Product	Size, in.	Tensile Strength, psi
Bright	Up to 7/8 incl. 1/2 to 1 1/8 incl. Over 1 1/8 to 1 1/2 incl.	85,000—105,000 75,000—100,000 65,000 min.
Quenched & Tempered (SAE Grade 5)	Up to 1/4 incl. Over 1/4 to 1 incl. Over 1 to 1 1/2 incl.	120,000 min. 115,000 min. 105,000 min.
Quenched & Tempered (SAE Grade 6)	Up to 1/8 incl. Over 1/8 to 1/4 incl.	140,000 min. 133,000 min.
Alloy (SAE Grade 7)	Up to 1 1/2 incl.	130,000 min.
Alloy (SAE Grade 8)	Up to 1 1/2 incl.	150,000 min.
Bright	Over 1 1/2 to 2 1/2 incl.	55,000 min.
Quenched & Tempered	Over 1 1/2 to 2 1/2 incl.	90,000 min.
Alloy	Over 1 1/2 to 2 1/2 incl.	125,000 min.

Note: Higher physicals, through use of selected alloys, can be supplied on special order.



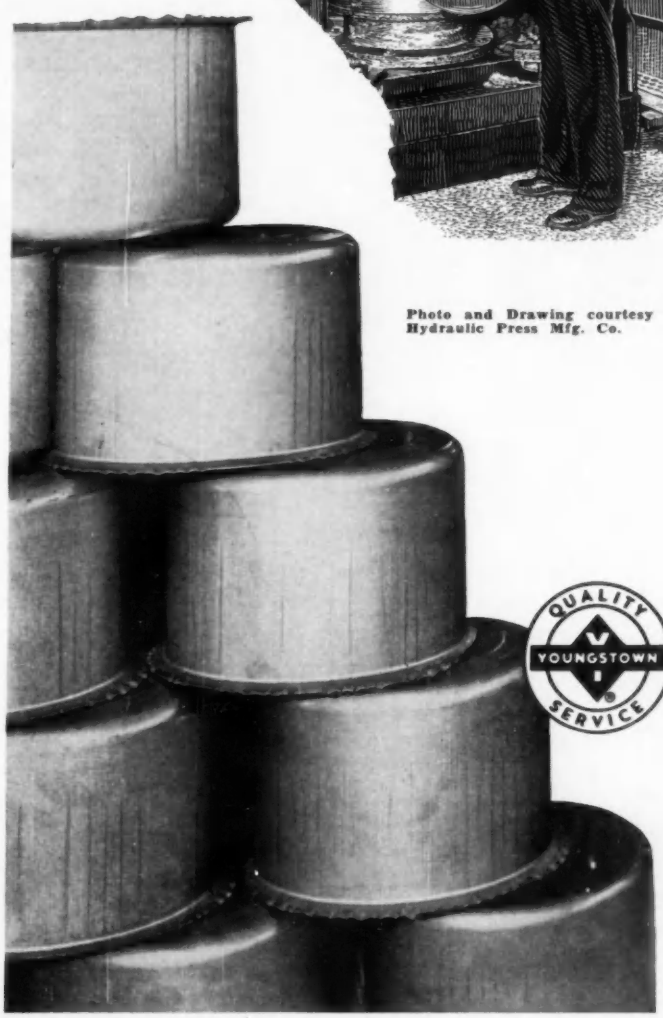
GET YOUR COPY NOW — Pocket-size card giving you physical properties of Cleveland hexagon and socket head cap screws and Cleveland Place bolts.

THE CLEVELAND CAP SCREW COMPANY
4444-10 Lee Road, Cleveland 28, Ohio
WAREHOUSES: Chicago • Philadelphia • New York • Los Angeles

YOUNGSTOWN SHEETS AND STRIP

Speed-Up Toughest Deep-Drawing Operations

Photo and Drawing courtesy of Hydraulic Press Mfg. Co.



Modern high-speed precision drawing and stamping operations require only the highest quality steel if top production - low reject rates are to be maintained on difficult-to-run parts. And the highest quality steel produced anywhere is Youngstown Sheets and Strip.

Our satisfied customers, across the nation, tell us time and time again: "Our production is increasing—Rejects falling off—Fabrication costs are down." Why not make Youngstown your regular sheet and strip specification from now on—for improving both product quality and the overall profit picture.

When you use Youngstown Sheets and Strip you can be sure metallurgical quality will never vary because they are produced by steelmakers—with over 56 years experience—using only the most scientific quality control techniques. This guarantees a proper blending of the required ductility, tensile strength, flatness and surface to meet your exact specifications.

Why not call or write your nearest Youngstown District Office, today, for metallurgical assistance or additional information—or write directly to our Home Office.

QUALITY YOUNGSTOWN SERVICE

COLD ROLLED SHEETS AND STRIP

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

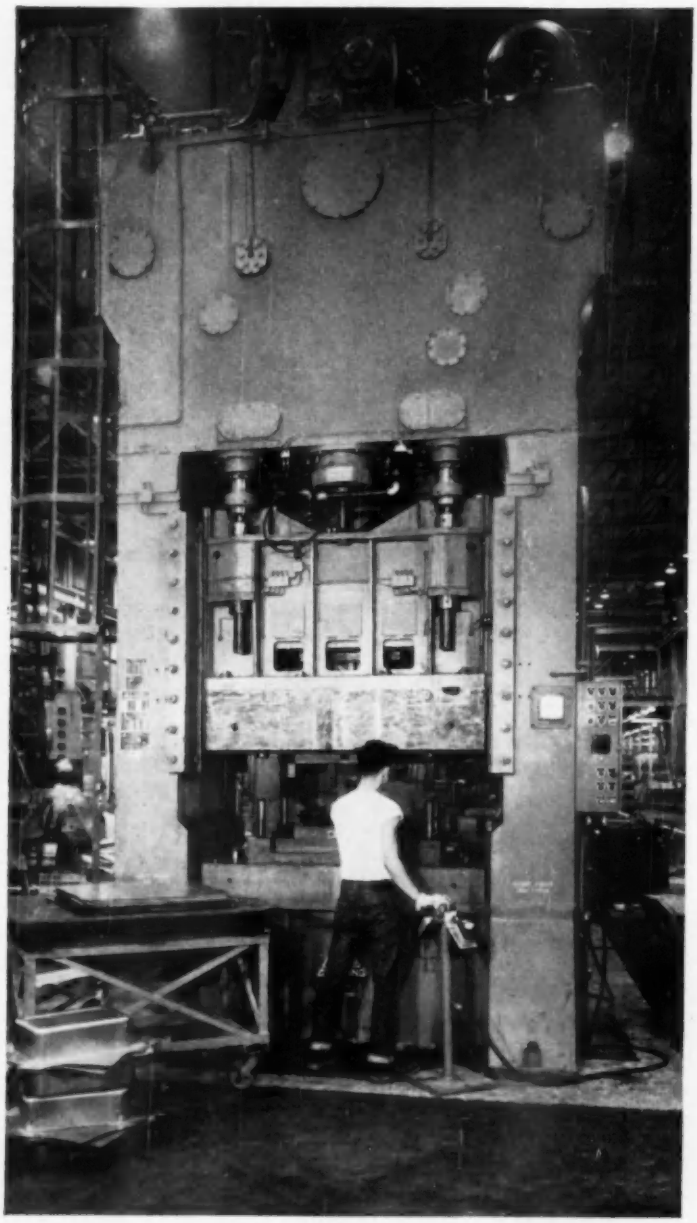
District Sales Offices in Principal Cities

Westinghouse Press Control with

CYPAK

is three-ways safe...

for operator, machine and work.



Westinghouse Press Control with CYPAK* offers a new high in industrial safety for machine operator, the machine dies and blanks, and work material.

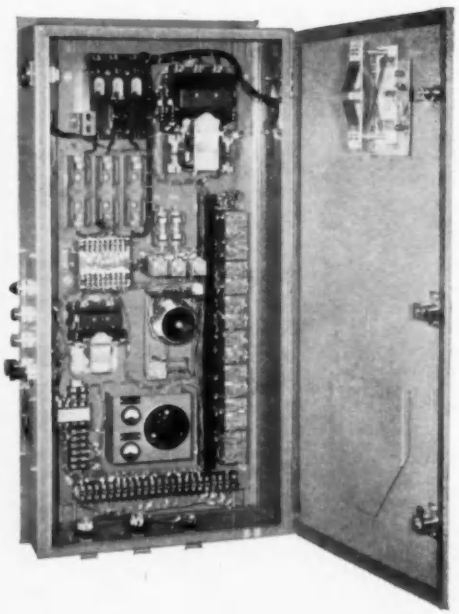
Because CYPAK eliminates the use of relays, there are no mechanical parts to stick or jam in the control and cause a repeat of the press. Patented anti-repeat clutch control circuit is self-checking, calling for two impulses to initiate a stroke.

Standard control has a four-position selector switch and run-pushbutton that are key-locked. An externally operated circuit breaker is another safety feature.

For complete information on reliably safe Westinghouse Press Control with CYPAK, call your Westinghouse Sales Engineer. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

*Trade-Mark

J-22050



YOU CAN BE SURE...IF IT'S Westinghouse

3 IMPORTANT ADVANTAGES FROM LORD CENTER BONDED ENGINE MOUNTINGS

Constant power increases and performance requirements have multiplied the demand for more effective mountings for heavy-duty automotive engine systems. LORD Center-Bonded Mountings were specifically designed to meet these requirements and provide these important advantages . . .

LOWER COST—LORD Center-Bonded Mountings provide lower initial and service-life cost through standardization in manufacture and greatly increased capacity to withstand severe use.

LONGER PERFORMANCE LIFE—LORD Center-Bonded Mountings outlast other mountings of more costly design. The one-piece construction (using live rubber bonded to metal) provides precision fit and increases capacity to reduce level of noise and absorb vibrations and stresses.

IMPROVED DESIGN—LORD developments in this mounting design have resulted in more effective shock and vibration control, noise isolation, and accommodation for misalignment.

All these advantages add up to better shock, vibration, and noise control for your automotive power plant—with LORD Center-Bonded Mountings. For detailed information contact the LORD Field Engineer nearest you or

LORD MANUFACTURING COMPANY • ERIE, PENNSYLVANIA

ATLANTA, GEORGIA · CEdar 7-1123
BOSTON, MASS. · HAncock 6-9135
CHICAGO, ILL. · Michigan 2-6010
CLEVELAND, OHIO · SHadyside 9-3175
DALLAS, TEXAS · Riverside 1-3392
DAYTON, OHIO · Michigan 8871
DETROIT, MICH. · TRinity 4-2060
LOS ANGELES, CAL. · HOllywood 4-7593
NEW YORK, N. Y. · Circle 7-3326
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"In Canada—Railway & Power Engineering Corporation Limited"

LORD
BONDED RUBBER

DESIGNERS AND PRODUCERS OF BONDED RUBBER PRODUCTS SINCE 1924

STAINLESS STEEL

½" O.D. TO

World's Largest Producer of

SPECIALTY WELDED TUBING

Offers Your Most Complete Source of Supply

You can find a tube to fit any requirement in Republic's full quality line of welded steel tubing.

Manufactured at the Steel and Tubes Division, Republic Tubing is welded by the ELECTRUNITE Process . . . a Continuous Electric Weld method that unites the wall under pressure without the addition of foreign or extra metal. Among other advantages this process assures uniformity of wall thickness, strength, ductility, concentricity, diameter and physical and mechanical properties.

Republic, the pioneer in this improved welding technique, is proud of its many "firsts" in the industry. In addition to introducing ELECTRUNITE® Boiler Tubes to the trade more than 25 years ago —plus Electrical Metallic Tubing and Dekoron®-Coated E.M.T. to the electrical industry, Republic was the first to provide a non-destructive electronic production method of testing tubing used for critical pressure applications, known to the trade as FARROWTEST®.

With plants in four locations, we are able to service you promptly with these complete ranges of analyses of carbon and stainless steels for mechanical, structural and pressure uses. A wide selection of sizes for every tube is also available. (See captions.)

Next time you need tubing or electrical raceways, whatever the application, call your nearest Steel and Tube Representative. Or contact us direct. We've solved a lot of problems in 50 years, and we'll be happy to tackle yours. To get descriptive literature, mail coupon at right.

REPUBLIC

REPUBLIC STEEL

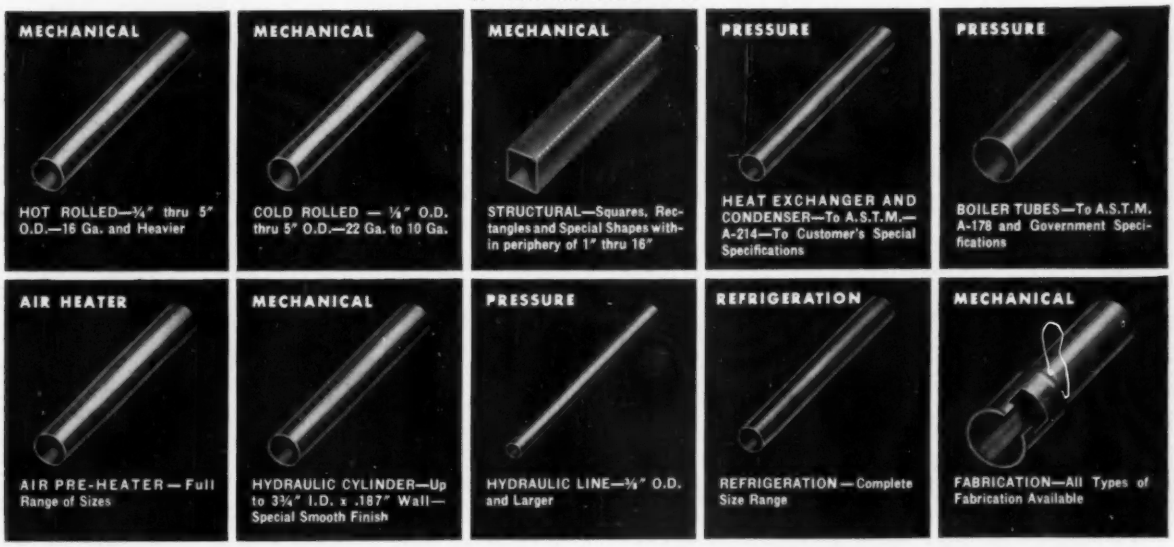
World's Widest Range of Standard Steels

TUBING AND PIPE

40" O.D.

CARBON STEEL TUBING

⅛" O.D. THROUGH 5" O.D.



ELECTRICAL RACEWAYS

E.M.T. ⅜" THROUGH 2"—RIGID STEEL CONDUIT ½" THROUGH 6"

STEEL

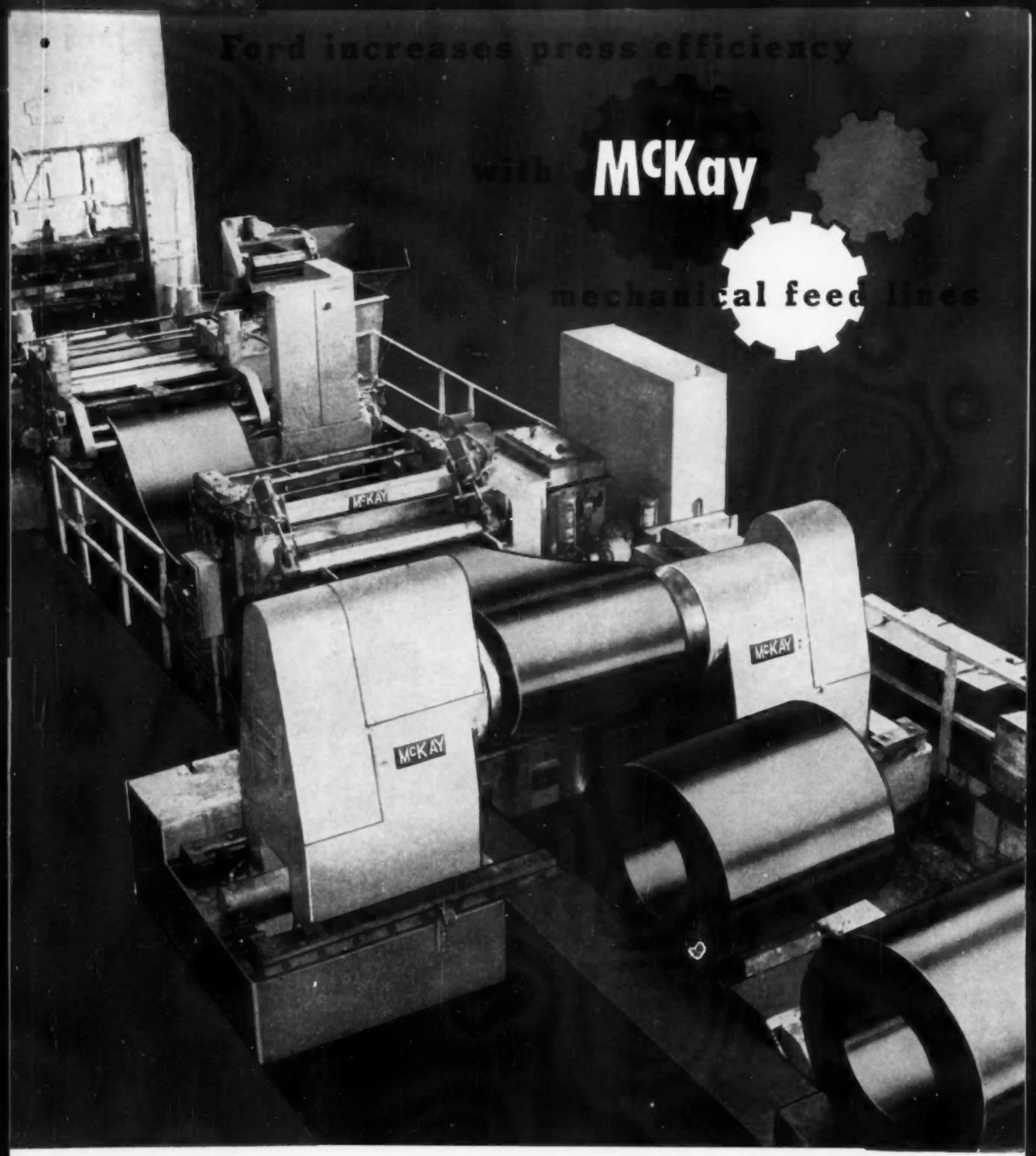
and Steel Products

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
Dept. C-2370
252 East 131st Street, Cleveland 8, Ohio

Please send me information on:

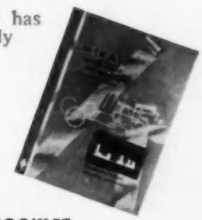
☐ Stainless Steel Tubing and Pipe — Type_____.
☐ Carbon Steel Tubing — Type_____.
Electrical Raceways — ☐ Electrical Metallic Tubing
☐ Rigid Steel Conduit
☐ Dekoron-Coated E. M. T.

Name_____Title_____
Company_____
Address_____
City_____Zone_____State_____



To increase the output and efficiency of large presses the Ford Motor Company has installed a McKay Mechanical Press Feed Line that for the first time successfully cleans, levels, and feeds heavier materials for today's production requirements. Designed to process strip up to 60" in width and 1/8" in thickness, it works equally well on progressive die or blanking presses without overloading. And, because it is floor-mounted with independent drive it can easily be adapted to future production needs.

If you want to increase the efficiency of your press equipment, why not talk with McKay—pioneer and leading producer of press feed and cut up lines.

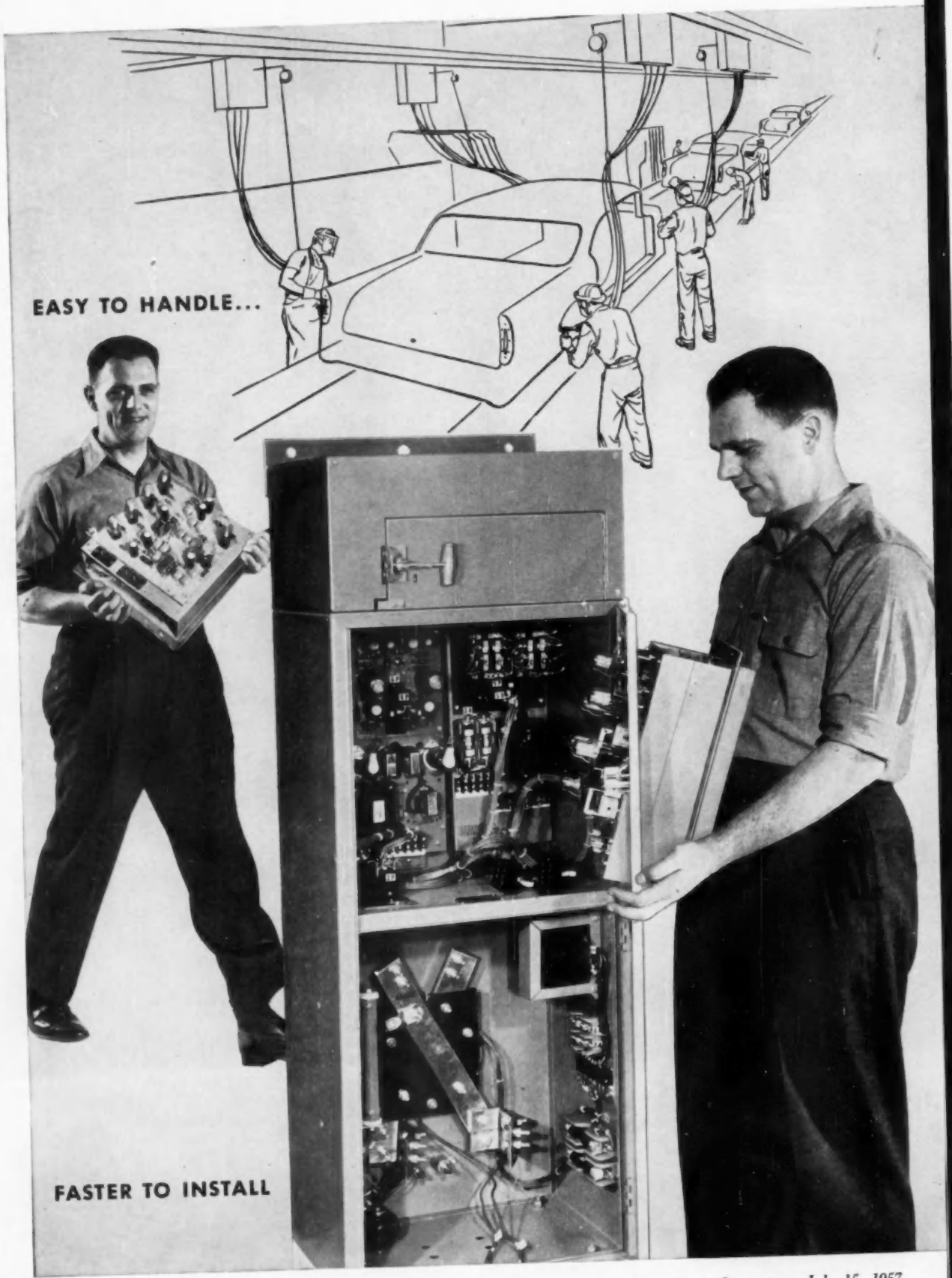


FREE BOOKLET

Complete illustrated data on McKay Press Feed and Cut Up Equipment will be mailed without charge at your request. Write for it today.

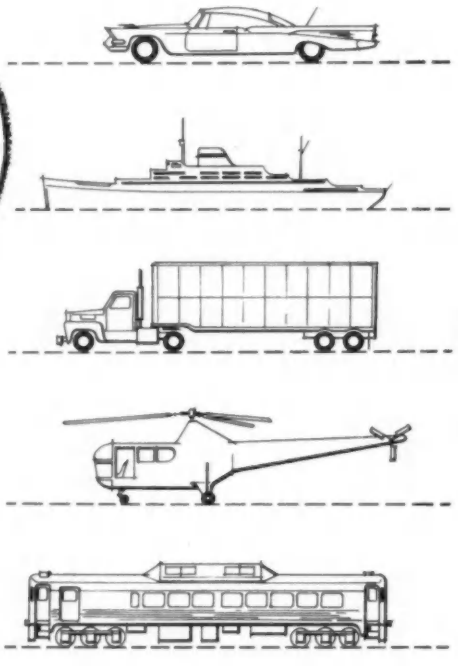
THE McKAY MACHINE COMPANY, Youngstown, Ohio

342


EASY TO HANDLE...
FASTER TO INSTALL

Everybody talks about the weather, but . . .

Inland's Filler Strip does something about it!



Weather doesn't have a chance against Inland Self-Sealing Weather Strip, and for good reason. It's *leakproof*.

Inland's patented filler strip is the secret. It is easily, quickly inserted into a small channel inside the seal. This increases the overall compression of the seal—*after seal has been installed*—giving permanent, positive protection against every extreme of weather. Does away with special moldings, binders, channels or messy, unreliable cements.

Inland Weather Strip's many standard sizes and shapes fit a wide variety of installation dimensions. Can be specially designed to fit any installation and service requirement. Get more information on Inland Self-Sealing Weather Strip now.

INLAND

self-sealing weather strip

INLAND MANUFACTURING

INLAND MANUFACTURING DIVISION
General Motors Corporation, Dayton, Ohio

CORPORATION
CARNEGIE, PENNSYLVANIA

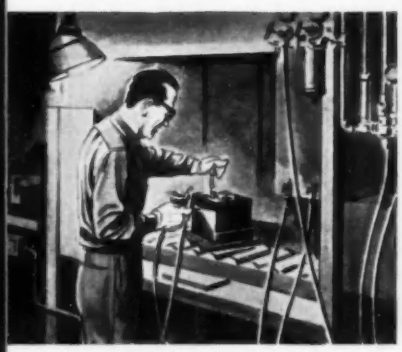
MILESTONES IN POWER PROGRESS

(NO. 3 IN A SERIES)

1907 — The first electric lights for cars

1955 — Globe introduces first mass-produced color-painted batteries

The first electric lights for cars touched off a welcome evolution towards safer, more enjoyable motoring. In the same vein, Globe pioneering not only improved the performance of batteries but also their appearance. The latest Globe *first* is mass-producing color-painted batteries for greater merchandisability and eye appeal.



In keeping with established quality control standards, Globe uses special paints for hand and spray painting operations. These are quick-drying to assure proper setting . . . long-lasting eye appeal.

Unmatched technical progress is only one of several Globe contributions to greater battery sales. Equally important, Globe's service includes modern battery merchandising — *through dramatic color*. Smart designs and vivid colors lift batteries from back-room stocks to prominent wall, counter and window displays that attract customers — build sales.

Another milestone in power — another *first* for Globe.

FOR FASTER, LOWER-COST DELIVERY!

Globe's sixteen plants are strategically located for fastest, lowest-cost shipments to all markets; thirteen (*) are producing creatively packaged dry-charged batteries.

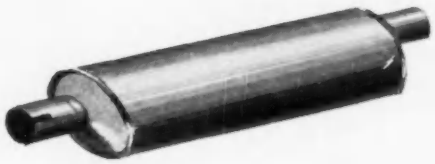
*ATLANTA, GA., *DALLAS, TEXAS, *EMPORIA, KANSAS, *HOUSTON, TEXAS, *LOUISVILLE, KY., *MEDFORD, MASS., *MEMPHIS, TENN., *MILWAUKEE, WIS., *MINERAL RIDGE, OHIO, *PHILADELPHIA, PA., *REIDSVILLE, NO. CAROLINA, *SAN JOSE, CALIF., *HASTINGS-ON-HUDSON, N. Y., LOS ANGELES, CALIF., OREGON CITY, ORE., AJAX (ONTARIO) CANADA

SPINNING POWER
GLOBE-UNION
SPLIT-SECOND STARTING

GLOBE-UNION INC.

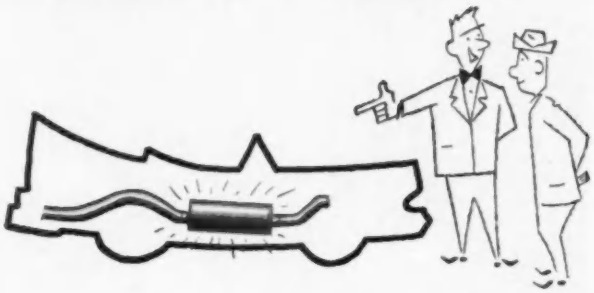
MILWAUKEE 1, WISCONSIN

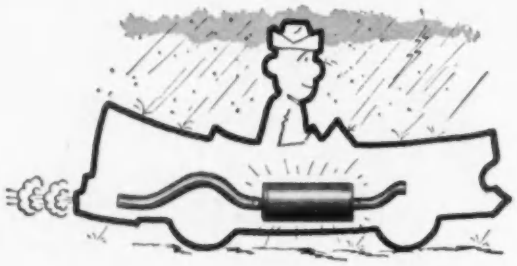
If it's Petroleum-powered there's a GLOBE-BUILT BATTERY right from the start!



Mufflers Made of Armco ALUMINIZED STEEL

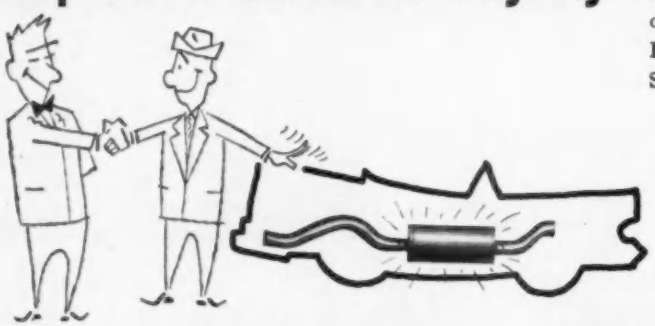
Last Twice as Long,





Reduce Dealer Problems,

Help Build Customer Loyalty



Designers know that early failure of any auto part makes it difficult for dealers to maintain customer loyalty. That's why it is important to equip your cars with mufflers made of durable Armco ALUMINIZED STEEL® Type 1.

Long-time road tests under actual operating conditions show that mufflers made of Armco ALUMINIZED STEEL outlast ordinary cold-rolled steel mufflers at least two to one.

In fact, during the tests only 4.2 per cent of the ALUMINIZED STEEL mufflers failed during the first 24 months of service, compared with 42 per cent of failures among the original cold-rolled steel mufflers.

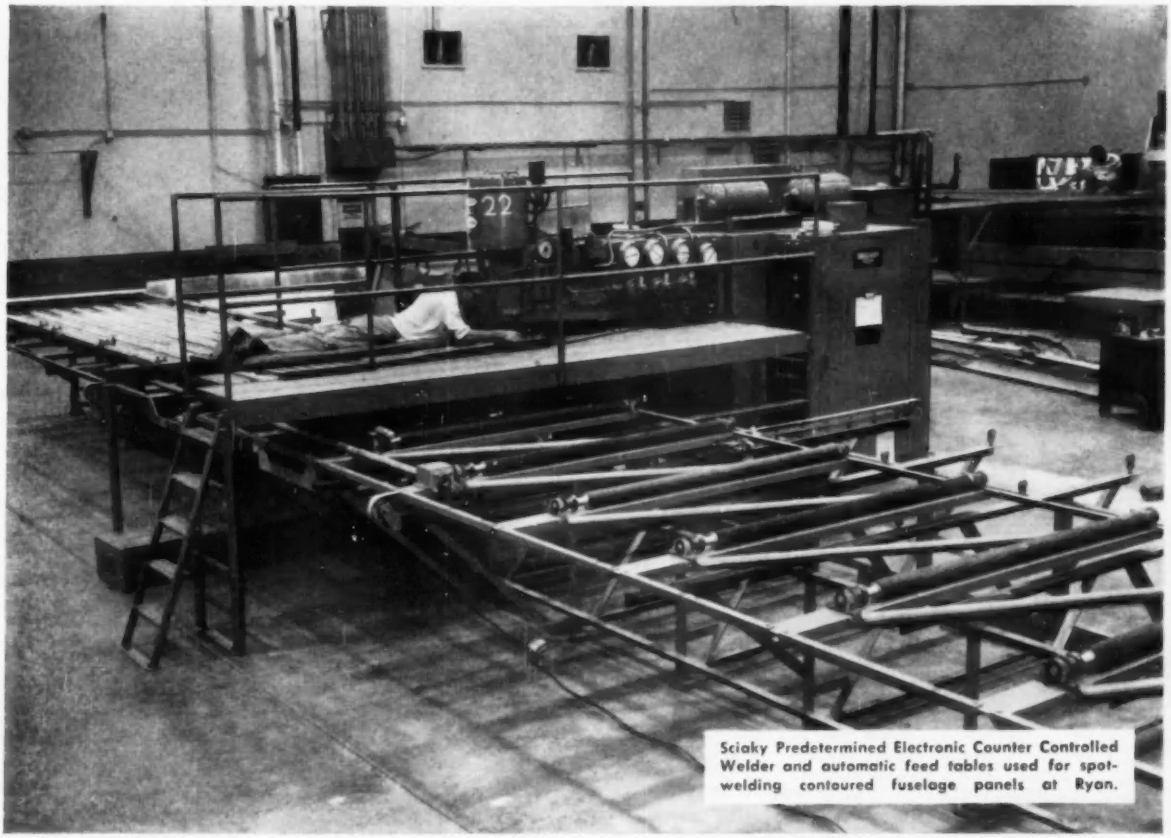
Spans First Ownership

This indicates that ALUMINIZED STEEL should greatly reduce muffler failures during the period of first ownership. It means better customer-dealer relationships and greater customer loyalty. For complete information on Armco ALUMINIZED STEEL Type 1, just write us at the address below.

ARMCO STEEL CORPORATION

1717 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION



Sciaky Predetermined Electronic Counter Controlled Welder and automatic feed tables used for spot-welding contoured fuselage panels at Ryan.

COMPLEX SPOTWELDING PROGRAM AT RYAN IS SEVERE TEST FOR NEW SCIAKY COUNTER CONTROL

Ryan Aeronautical Company, San Diego, California has achieved a significant first in resistance welding—automatic spot welding of large contoured fuselage panels for the Boeing KC-135 and "707" Jets.

Referring to their new Sciaky Counter Controlled Welder, Mr. Bob Fullerton, Ryan's Senior Welding Engineer, stated, *"This is one new welding development that really does what the advance announcements promised."*

PRECISE CONTROL

Early in the program, it became obvious that precise control of all welder functions and absolute production consistency of welding was essential. Introduction of the new Predetermined Electronic Counter Controlled Welder by Sciaky helped solve this problem.

Here, for the first time, is a welder in which functions are controlled to a fraction of a cycle of alternating current. Control settings are realized with exactness. The unvarying accuracy of counting is maintained throughout the entire range for the longest run at the highest production rate. Any production control setting is readily reproducible at any time.

CONSISTENT, SAFE WELDS

The consistently safe welds produced by the Sciaky Counter Weld Control are essential to the Ryan program since the skin is a load-bearing member. In addition, the size of the assembly—largest every sub-contracted in the industry—will not tolerate even the possibility of rejects due to imperfect welds.

The importance of consistently perfect welds is emphasized by the tremendous number of spotwelds in the aft fuselage sections of the Boeing jet tanker-transports. Approximately 77,000 spot welds are required to join skins to skins, skins to doublers and stringers, and bulkhead components together.

TAPE COMMAND OF WELDING OPERATIONS

Welding operations on the various assemblies can be controlled by a tape command unit providing complete piece part positioning in all directions. Automatic interlock between positioner and welder is required. This would provide more automatic operation.

COMPLEX TOOL-UP

Handling and positioning the aluminum skins also presented a major problem. Ryan solved this by installing huge positioning tables with push button controls to permit automatic feeding.

The characteristics and consistent operation of the Sciaky Counter Controlled Welder combine perfectly with the automatic abilities and consistency of the Ryan positioning table to satisfy the requirements of this complex production assembling operation.

LITERATURE AVAILABLE

Technical bulletins completely describing the new Sciaky Predetermined Electronic Counter Weld Control are available. Write on your company letterhead requesting Bulletins 338 and 339.

SCIAKY® *Helps Put Profit Into Manufacturing*

Sciaky Bros., Inc., 4925 West 67th St., Chicago 38, Ill., Portsmouth 7-5600

backed by a 50-year
record for dependability...

★ ★ ★ ★

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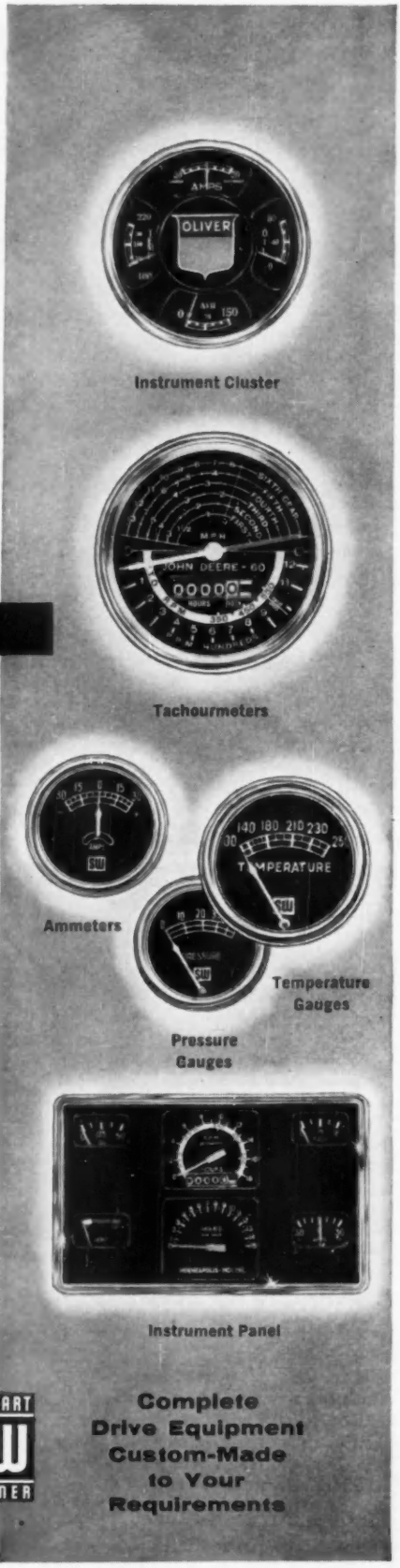
including complete drive equipment—designed, engineered and manufactured to your specifications

... all from one manufacturing source!

For half a century, Stewart-Warner has made quality instruments and gauges for agricultural applications.

Many leading implement manufacturers capitalize on this unmatched experience and know-how by specifying Stewart-Warner equipment *exclusively.*

The complete Stewart-Warner line offers you a wide choice of gauges, speedometers, tachometers, and tachourmeters. Entire panels can be custom-made to your own specification. Everything you need for a complete installation—including flexible shafts, gears, and adapters. Let Stewart-Warner supply *all* your instrument needs—*from one dependable manufacturing source.*



For further information, write:

STEWART-WARNER

Dept. X-77, Original Equipment Sales
1840 Diversey Parkway, Chicago 14, Illinois

STEWART SW WARNER

Large Part...Small Part ...in Natural or Synthetic Rubber...

PHOENIX 4-STEP SERVICE

ASSURES A BETTER END PRODUCT

Phoenix 4-Step Service can be of invaluable assistance in helping you utilize rubber to develop a better end product. Compounding and fabricating rubber has been a Phoenix specialty for 25 years. This concentration enables Phoenix to develop natural and synthetic rubber compounds to solve a variety of product design problems involving such factors as high and low temperature, abrasion, weather, load, torque, corrosive fluids and bonding to other materials. You can confidently put *your* rubber problem to Phoenix for an imaginative and thoroughly satisfactory solution!

Leading Manufacturers of Custom Molded Mechanical Rubber

STEP 1—ANALYSIS Phoenix studies the part to determine which will be the most suitable rubber compound.

STEP 2—DESIGN Phoenix assists in designing the part to perform the function intended at an acceptable cost.

STEP 3—COMPOUNDING Then Phoenix compounds and tests the most suitable natural or synthetic rubber.

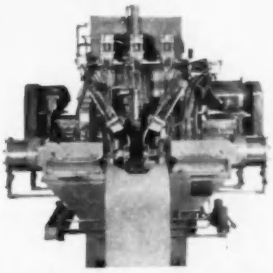
STEP 4—MANUFACTURE Modern equipment and exacting production control assure fast, accurate molding.

PHOENIX

RUBBER PRODUCTS DIVISION
PHOENIX MANUFACTURING COMPANY
JOLIET, ILL. • FOUNDED 1882

Integrated Manufacturing Facilities: RUBBER PRODUCTS DIVISION, FLANGE AND FORGING DIVISION, STEEL MILL DIVISION, STEEL BUILDING PRODUCTS DIVISION, HORSESHOE PRODUCTS DIVISION

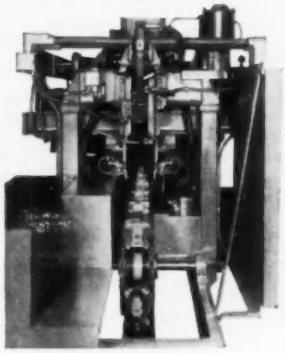
Entry end of line



Federal

PACKAGED PRODUCTION LINE

Automates Pedal Bracket Manufacture for Dodge!



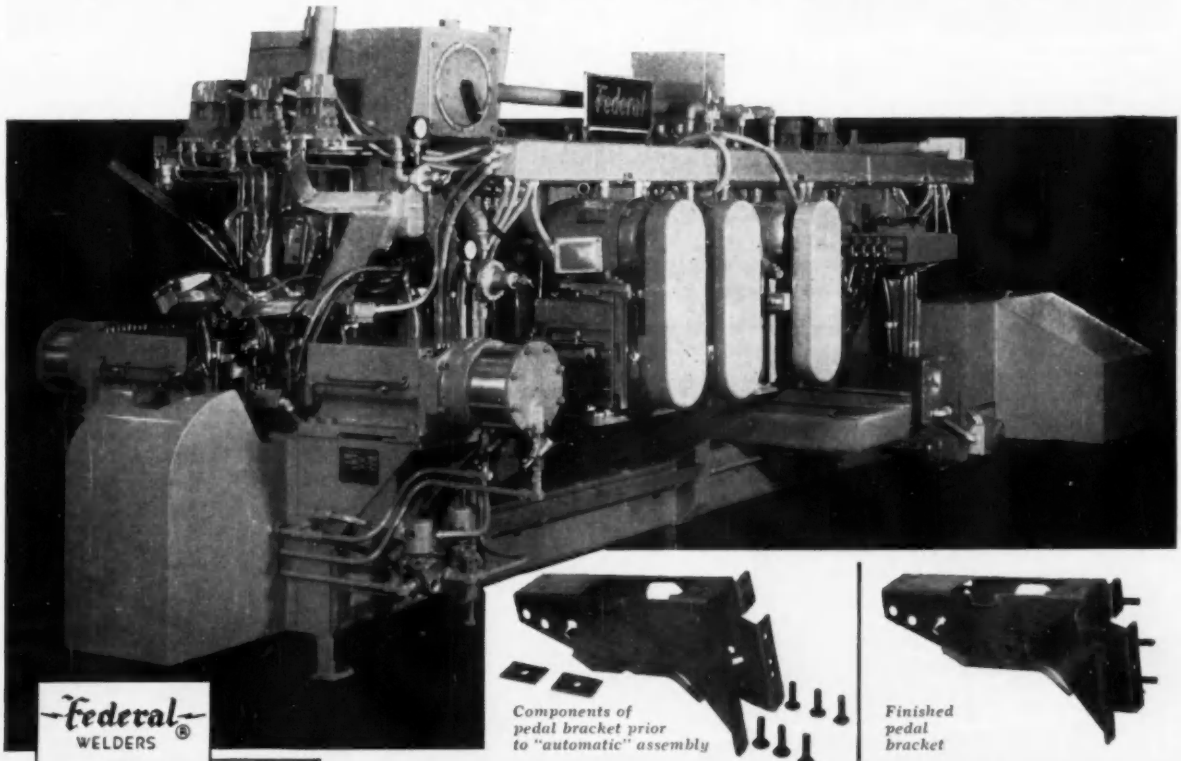
Exit end of line

SINGLE LINE AUTOMATICALLY FEEDS, SPOT FACES, REAMS, DE-BURRS, WELDS TO SPEED PRODUCTION, CONTROL UNIFORMITY OF PEDAL PART

The Dodge Division of the Chrysler Corporation recently set into operation a single Federal machine that performs manufacturing functions normally requiring many separate pieces of equipment. In the fabrication of automotive pedal brackets this Federal "Packaged Production Line" was made to feed and weld two pads to the bracket, spot face one pad, ream and de-burr holes in each pad, feed and weld six mounting bolts and eject the finished piece at a rate of 775 units per hour.

The combining of several manufacturing operations into one has many natural advantages. It means one source responsibility, reduced floor space, and handling requirements, equipment economies and greater product uniformity.

Don't overlook these benefits—talk with Federal—a pioneer in the development and manufacture of "Packaged Production Lines."



Components of pedal bracket prior to "automatic" assembly

Finished pedal bracket

Federal WELDERS ®

Warco PRESSES ®

The Federal Machine and Welder Company

225

WARREN, OHIO

Accurate machining assures the smooth, cool operation of the Wagner Rotary Air Compressor. Close dimensions on all planes of the rotor eliminate vibration . . . permit compressor blades to function smoothly at high speeds.

Accurate machining and gauge testing of the stator, as well as the rotor, also contributes to the rotary compressor's ability to operate for long periods of time without developing leaks or losing efficiency.

Compressor shafts are given the "cold box" treatment. When exposed to very low temperatures, the shaft diameter contracts. This altered shaft diameter allows proper insertion into a heated rotor to form a strong, composite unit.

Compressor rotors are subjected to high oven temperatures to expand rotor diameters. Shafts and rotors joined together under these extreme conditions resume their original relative size to create an extra strong assembly.

Assembled rotary compressors are hooked up to air lines and operating air pressure is applied for leakage tests. While holding pressure, entire compressor is submerged to determine whether any air is escaping.

Every Wagner Rotary Air Compressor is given a rigorous "run-in" test to determine its resistance to overheating and its overall performance. Running temperatures, vibration, noise and air output are carefully noted and analyzed.

Rigid Quality Control assures uniform, safe performance and efficiency of all
WAGNER ROTARY AIR COMPRESSORS

Wagner Rotary Air Compressors set exceptional records of safe performance, dependability, and air brake operating economy because of Wagner's "Quality Control" manufacturing program. Every Wagner Compressor must pass rigid inspection and tests before being released for shipment. That's why every user of a Wagner Rotary Air Compressor can rely on an adequate supply of air pressure at all times, fast air recovery, long service life, and *safer* brakes. The vehicles you manufacture will be safer if they are equipped with Wagner Air Brake Systems—supplied with Wagner Rotary Air Compressors. Complete details on Wagner Air Brake Systems, Rotary Air Compressors, and other Wagner Air Brake Components are contained in Catalog KU-201. Write for your file copy today.

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LOCKHEED HYDRAULIC BRAKE PARTS and FLUID • NoRoL • CoMoX BRAKE LINING • AIR BRAKES • AIR HORNS • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES

Modern Window Mullion Tubes by Standard

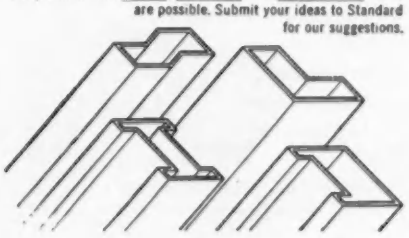
The Browne Window Manufacturing Company specified Standard Mullion Tubes for the Exchange Bank and Trust Company, Dallas, Texas. Standard Mullion Tubes—1¾" x 4" x .180 wall—were chosen for strength and functional utility. Thousands of feet of this tubing hold the curtains of glass and colorful insulated spandrels that make this building as modern as tomorrow.

Specified for Dallas Exchange Park Building . . . City of Tomorrow

Standard Tube is pleased to be a part of the Dallas Exchange Park—a veritable "city within a city" consisting of 4 multi-storied buildings, a thousand room hotel, a medical research center, 150 retail shops, a 4 story building to house a major department store. We are specialists in square, rectangular and special tubing for a multitude of applications ranging from modern lightweight tubular furniture to rugged structural members for agricultural machinery, as well as for architectural applications.

We produce square tubing ranging in size from ¼" OD to 4" OD up to ¼" wall thickness and rectangular and special shapes of equivalent sizes. For full information on Standard products, plant facilities and engineering assistance, write for free 8 page folder.

Many complicated square, rectangular and special-shaped tubes are possible. Submit your ideas to Standard for our suggestions.

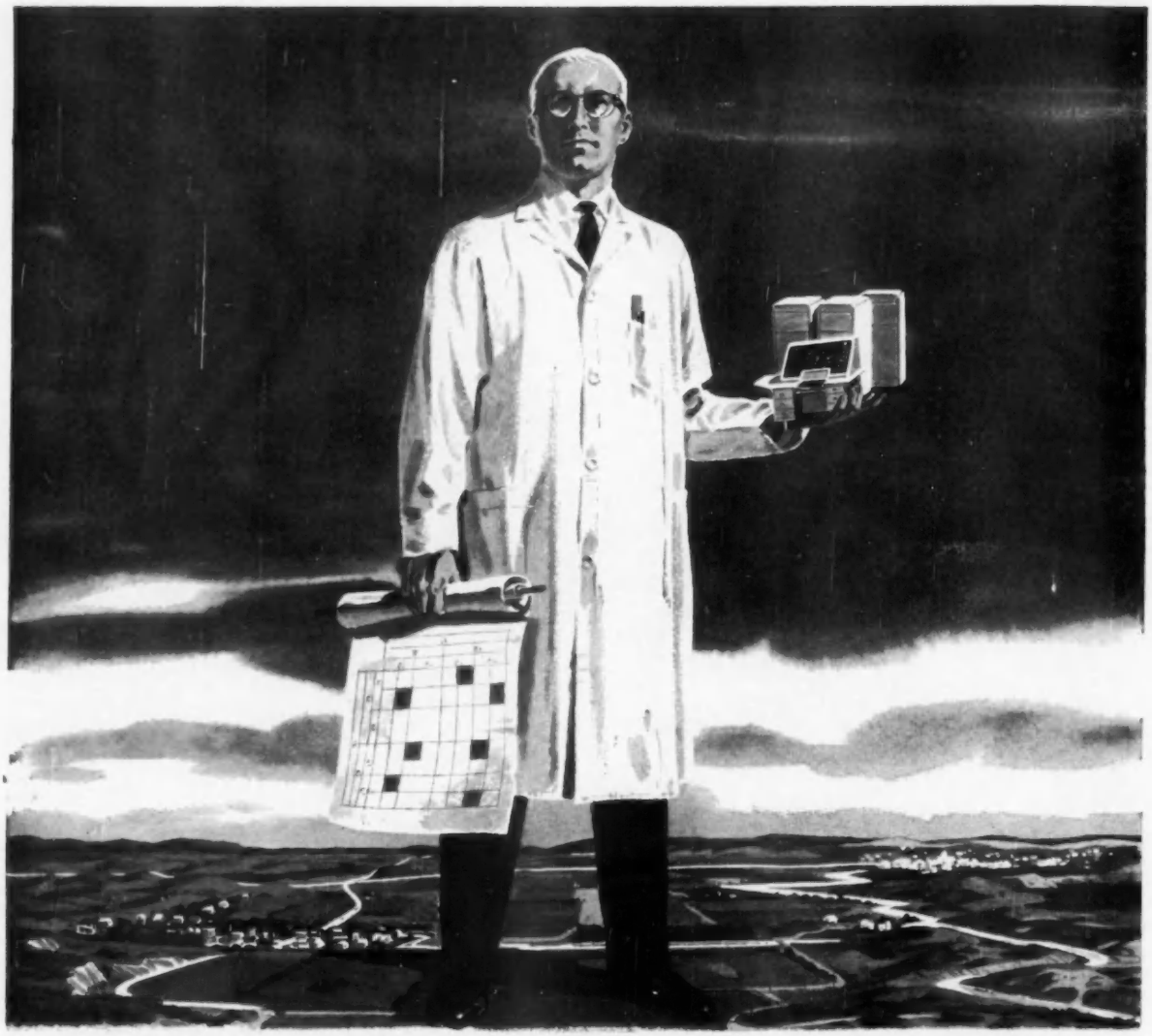


STANDARD

THE STANDARD TUBE COMPANY

24400 PLYMOUTH ROAD • DETROIT 39, MICHIGAN

Welded stainless tubing and pipe • Welded carbon steel mechanical • Boiler and heat exchanger • Exclusive rigidized patterns • Special shapes • Steel Tubing—Sizes ½" OD to 5½" OD .028 to .260 wall • Stainless Pipe—Schedule 40: ⅛" to 2" I.P.S.; Schedules 5 and 10: ⅛" to 4" I.P.S.—Stainless Tube—¼" to 4¾" OD—.025 to .165 wall



Latin Square, Univac and 36 years experience

all three help assure National Seals are best engineered

Univac you know, experience you know; the Latin Square? An ancient, half-forgotten solver of problems having many variables. Today, National Seal engineers use it to reduce exploratory engineering time as much as 75%.

Old, new, time-tested and visionary—National Seal engineers embrace every approach that can help keep National Seals the best engineered in America. Results have been good. Syntech®, the milestone in synthetic rubber seals and Micro-Torc®, major forward step in leather seals, are but two examples.

National Seal's advanced engineering, in plant or field, is ready now to help you solve sealing problems. This help is yours for a telephone call.

VITAL: Whatever seals you buy, save trouble and expense later on by specifying them "on the board." For safety, have specifications checked by a National Seal engineer.

NATIONAL SEAL Division, Federal-Mogul-Bower Bearings, Inc.
General Offices: Redwood City, California; Plants: Van Wert, Ohio, Redwood City and Downey, California

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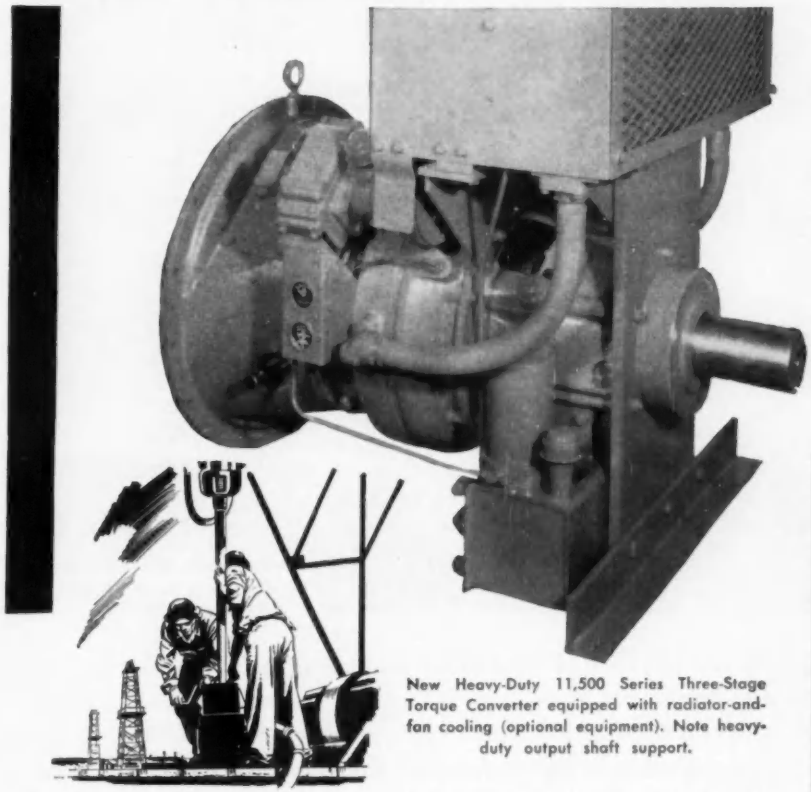
Twin Disc announces new Heavy-Duty 11,500 Series Torque Converter



New Heavy-Duty 11,500 Series Three-Stage Torque Converter equipped with radiator-and-fan cooling (optional equipment). Note heavy-duty output shaft support.

Further extending its line of three-stage torque converters, Twin Disc Clutch Company now offers industry an additional version of its popular 11,500 Series Three-Stage Torque Converters.

Designated the Heavy-Duty 11,500 Series (a Standard-Duty version will be continued), the new units have a maximum rating of 586 hp at 2200 rpm. Maximum input torque is 1400 pound-feet. Impellers are available for specific torque ratings of 340, 390, 450 and 540 pound-feet.

Current production units include the Model CF, which provides a clutch at the flywheel, and the Model F, which is connected to the flywheel with a driving ring.

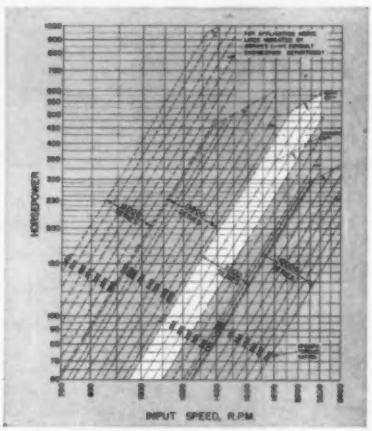
A Twin Disc C-3 Rear End, with the output shaft supported by two heavy-duty roller bearings, is available with either model, permitting maximum output sidepull.

The complete line of Twin Disc Three-Stage Torque Converters includes five distinct sizes; the 10,000 Series, Standard-Duty 11,500 Series, Heavy-Duty 11,500 Series, 13,800 Series and the 16,000 Series. The line offers 33 specific torque ratings and input and output arrangements to meet virtually every industrial requirement from 60 to 1000 hp and from 700 to 2400 rpm.

These three-stage torque converters have long proved themselves on such applications as crawler tractors, drilling rigs, shovels, yarders, locomotives and many, many others. They offer such advantages as multiplying engine input torque (up to 6:1) exactly as required by load . . . cushioning out destructive shocks and vibrations . . . minimizing maintenance and downtime . . . and *producing more work on a hp-cost basis.*

Twin Disc, the only manufacturer producing both three-stage and single-stage designs, offers single-stage torque converters for engines producing 30 to 212 hp. Besides this, Twin Disc makes available a complete line of fluid couplings, to 850 hp, and friction clutches, to 1050 hp.

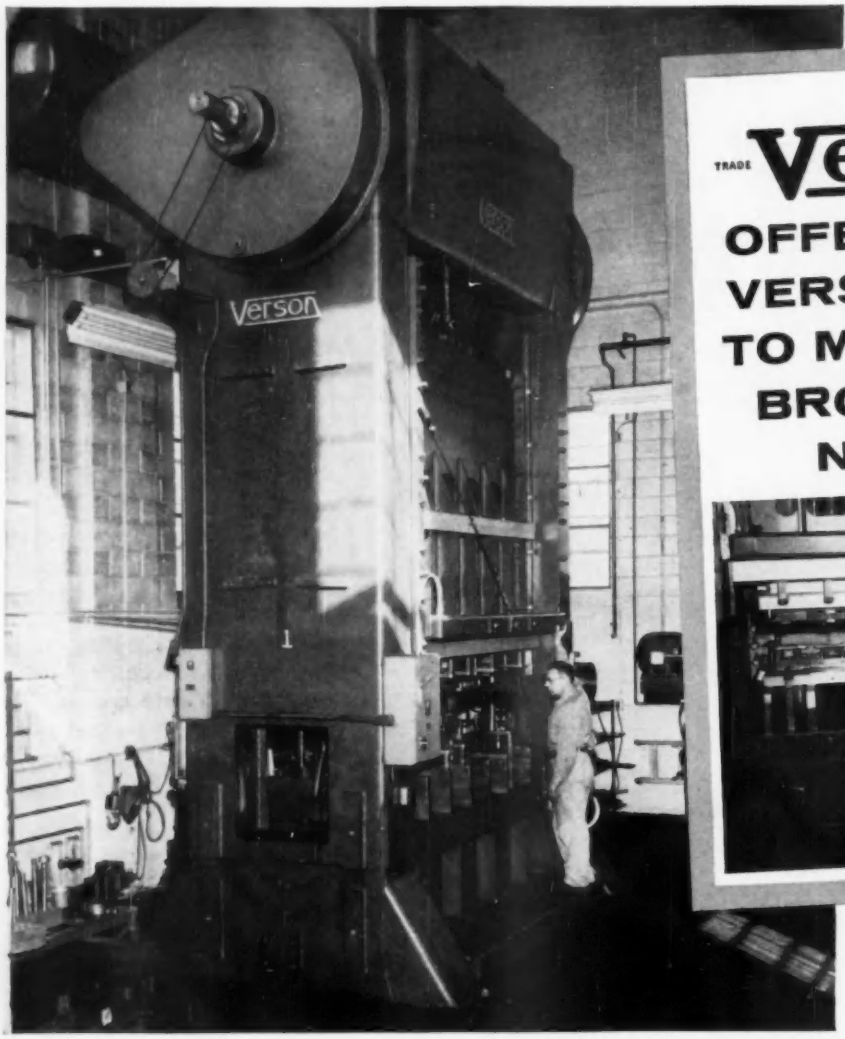
Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois . . . with parts and service facilities throughout most of the world.



Unshaded area in above curves compares hp and rpm characteristics of the Heavy-Duty 11,500 Series Torque Converter with other Twin Disc Three-Stage Torque Converters.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Torque Converters



TRADE **Verson** MARK

OFFERS YOU VERSATILITY TO MEET THE BROADEST NEEDS

A typical job at Westlof Tool & Die Co. — die tryout on progressive tooling. The press is also used for die tryout on Transmat type tooling.

Catalog G-57 presents basic data on all types of Verson presses. Write for your copy.

Die tryout for a tool and die shop is probably one of the severest tests of the versatility of a press. At Westlof Tool & Die Co., Detroit, Michigan, a 300 ton Verson double crank, straight side press is used for this purpose.

The press itself incorporates several features which are examples of the versatility Verson engineering can provide: The ram is equipped with three triple bank cushions adjustable right or left to 7″ centers. The bed has two large cushions, one right, one left. All cushions are independently controlled. The press is equipped for application of coil feeding equipment should it become necessary. Press speed is variable from 15 to 30 strokes per minute. Power adjustment of the slide is 15″.

If your requirements call for great versatility, bring your problem to Verson. For specific recommendations, just send an outline of your needs.

A Verson Press for every job from 60 tons up.

TRADE **Verson** MARK

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

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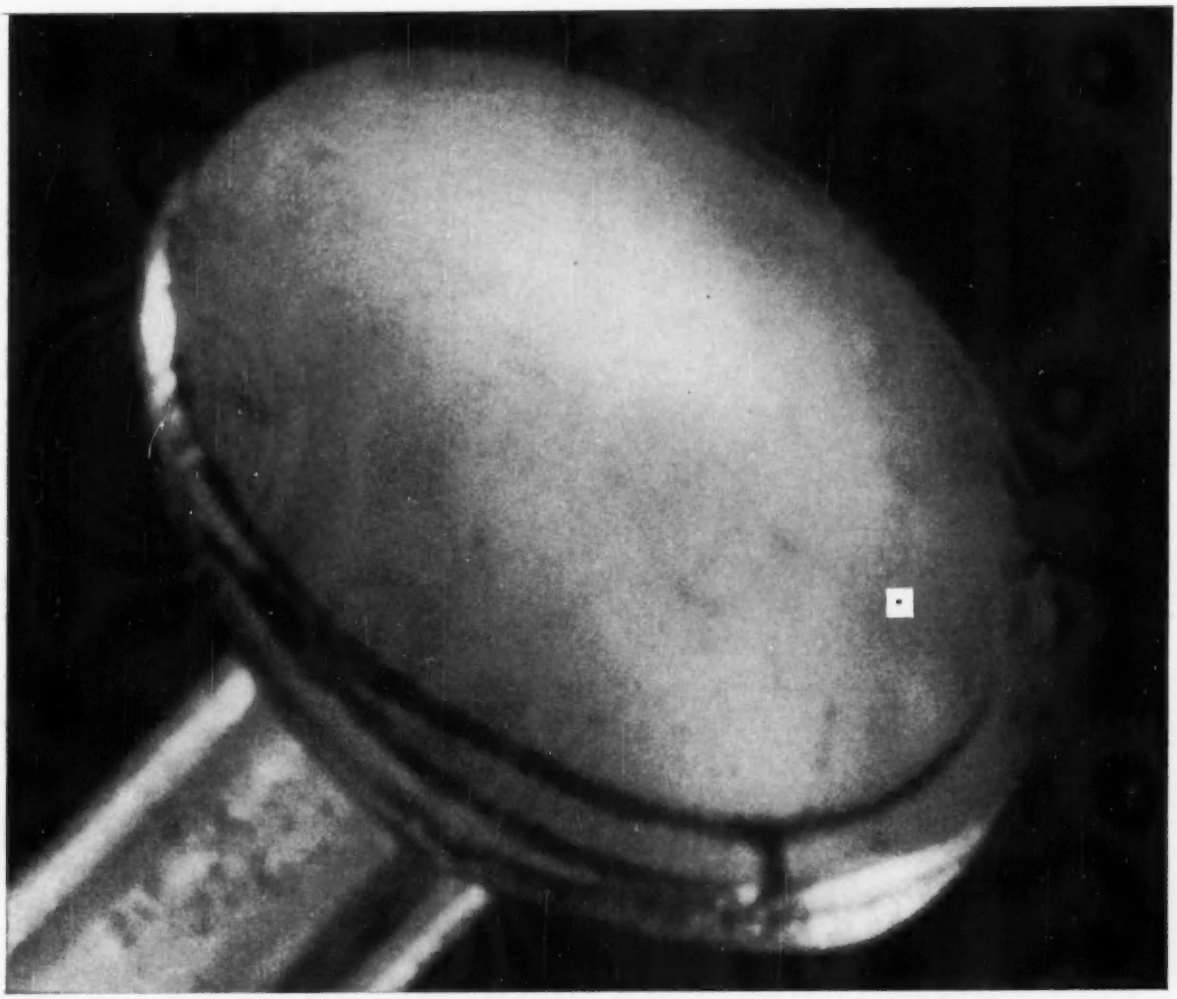
MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES



Head of a common pin, enlarged 100 times. The black speck within the white square is approximately 1000 microns.

Micron on a pinhead!

It takes twenty microns to be visible to the naked eye. There are twenty-five of them in each white blood cell in your veins.

But a micron is too *large* for measurement in some of the filtration Purolator is doing today.

It's a fact. Some of our filters have to remove particles that are sub-micronic in size. That's how far we've come in keeping pace with today's demand for better performance and longer life in industrial equipment and consumer goods. As a result, precision fits, closer running clearances, smoother surface finishes and far more effective quality control are the rule . . . and this trend is continuing. That's why it is important that the potential savings be clearly understood by the people responsible for important decisions in this field.

Application of our engineering skill to the widest diversity of filtration problems for more than three decades has provided us with a unique experience. Whatever filtration problem industry runs into . . . chances are we've already solved it.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada

THIS INSTRON TESTER measures the energy a tire carcass can absorb before failing. The tests on nylon cord tires proved that nylon's toughness can absorb approximately 2.5 times more energy than ordinary tire cord.

ON THE ROAD, in millions of miles of continuous service on taxi fleets, nylon cord tires have proved their shock-absorbing toughness and superior dependability . . . their capacity to withstand constant flexing and heat buildup.

TEST AFTER TEST PROVES NYLON TIRE CORD GIVES EXTRA TIRE STRENGTH FOR EXTRA SAFETY

Advertising in top magazines will run throughout the year to tell your customers of nylon's lasting ability to shrug off the abuse of "just-around-town" driving and thus offer utmost safety on the highway.

Modern engineering has given us the heaviest, most powerful cars ever to run on superhighways. Motorists need the lasting strength of nylon cord tires—tires able to withstand added strains of today's mile-after-mile sustained-speed driving. Stresses of power steering, power braking and higher horsepowers call for nylon's shock-absorbing toughness. Also, nylon cord tires can reduce unsprung weight.

Nylon cord protects against the four major causes of blowout: heat, moisture, flex fatigue and bruise damage; resists unseen carcass injuries that can seriously weaken tires.

Surveys and rising sales both show that motorists know and want the extra strength and safety of nylon cord tires.

Du Pont produces the nylon fiber.
All tire manufacturers make nylon cord tires.

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Today, the strongest, safest tires are made with nylon cord

Inside these New Mallory Vibrators...

New performance for your power supply

New advances in contact design—based on more than a quarter century of Mallory pioneering in the vibrator field—give today's Mallory vibrators even better performance than ever.

Count on these new Mallory models for up to 100% longer life... for faster starts... for extremely low mechanical hum ... for greater consistency of output throughout their life. Arcing, erosion, contact transfer and variations in spacing have been greatly reduced. Heat dissipation is higher.

A complete series of models, incorporating new ideas in contact technology, covers practically any vibrator power supply requirements you may have for new equipment on your drawing boards. Check the table shown here, and call a Mallory vibrator specialist for a consultation on your application.

	Series	Description	Applications
Interrupter types	1600	light to medium duty, shunt drive	automotive, electronics
	1500	medium to heavy duty, separate drive	communications, electronics
	1700	heavy duty, separate drive, split reed	communications, electronics
	1750	heavy duty, separate drive, duplex operation	communications, electronics
Self-rectifying types	1800	nominal duty, shunt drive	electronic equipment—for high efficiency, small space
	1850	nominal duty, separate drive	

Serving Industry with These Products:

Electromechanical — Resistors • Switches • Tuning Devices • Vibrators
Electrochemical — Capacitors • Mercury and Zinc-Carbon Batteries
Metallurgical — Contacts • Special Metals • Welding Materials

Parts distributors in all major cities stock Mallory standard components for your convenience.

Expect more . . . get more from

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO. Inc., INDIANAPOLIS 6, INDIANA

SHELBY SEAMLESS TUBING helps "Pole-Master"* handle poles like matchsticks

THE POWERFUL, two-legged boom of this "Pole-Master" Hydraulic Derrick is made of cold drawn tubes of USS Shelby Seamless Mechanical Tubing. Capable of handling poles up to 75 feet in length with relative ease, the boom is activated by two hydraulic cylinders, also of Shelby Seamless, which are powered by a heavy-duty hydraulic pump. The derrick has an operating arc of more than 180 degrees, and is designed to "set" poles or "pull" them from the ground. The "Pole-Master" can be used under the most severe work conditions in any weather or climate.

Here is an application in which Shelby Seamless Tubing really excels, for it brings into play all the desirable qualities that Shelby Seamless possesses—high strength, uniformity, shock absorbency, dimensional accuracy, lightness and workability.

Produced to exacting standards by the world's largest manufacturer of tubular steel products, Shelby Seamless is available in a wide range of diameters, wall thicknesses, various shapes and steel analyses. You are invited to call on our engineers for assistance. They will be happy to submit recommendations based on a study of your particular requirements.

*Manufacturer's name on request.

WALLS WITHOUT WELDS

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS **SHELBY SEAMLESS MECHANICAL TUBING**
A PRODUCT OF NATIONAL TUBE

UNITED STATES STEEL

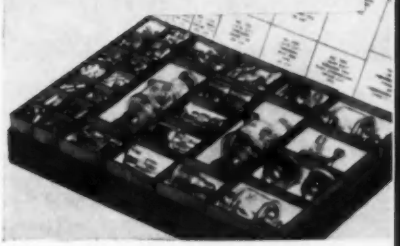
Design "Low Cost" Into YOUR Equipment

GITS

World's Largest Selection of Low-Cost Lubricating Devices

LUBRIKIT . . . An assortment of 95 oil cups of 29 different types. Gits sales records show these oilers are most used for replacement and maintenance. Contents of each separate bin are clearly described on Inside Cover.

Special Introductory Price
Just $14.95 F.O.B. Factory
Satisfaction or your money back

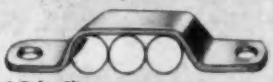


CLIPS FOR ATTACHING TUBING

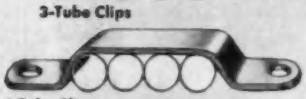
When ordering, specify ¼", ⅜" or ⅜" tubes. Style TF.

Single Clips

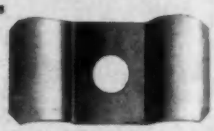
Double Clips



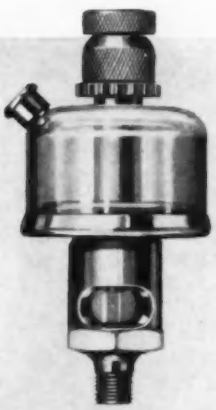
3-Tube Clips



4-Tube Clips



Double Clips — Wing Type

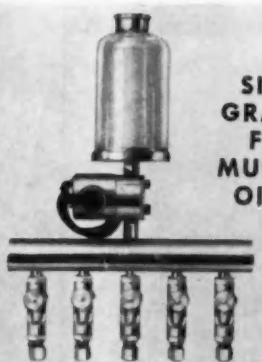


SIGHT GRAVITY FEED OILERS

Rate of oil flow regulated by needle valve, directly observed through sight glass in stem. Shut-off knob does not affect needle valve adjustment. Visible oil supply. Non-breakable. Tops in convenience and dependability, at low cost. Style NFU—No. 3602-A.

GEAR CASE GAUGES

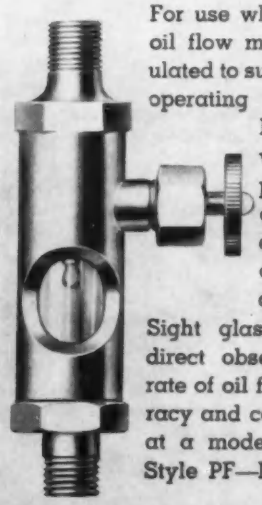
This oil gauge plug permits instant checking of oil level within a transmission or gear case. For use where construction permits insertion in tapped hole. A valuable addition to any such equipment — at very low cost. Style BW—No. 4042.



SIGHT GRAVITY FEED MULTIPLE OILERS

This one unit replaces 3 to 8 individual oilers. Maximum practicality in a small central lubrication system. Positive cut-off during idle periods. Individual vibration-proof needle valve adjustments. With solenoid control (Illustrated): Style MDS—No. 4685-A. Without solenoid: Style MD.

SIGHT GAUGES



For use where rate of oil flow must be regulated to suit changing operating conditions. Needle valve permits extremely accurate adjustment of oil feed. Sight glass provides direct observation of rate of oil flow. Accuracy and convenience at a moderate price. Style PF—No. 4290.

Don't price yourself out of the market. When you design proper lubrication into your equipment, specify GITS Lubricating Devices—the widest selection available anywhere. The items pictured above are only a few of our many thousands of lubricating devices. At the design stage, get the GITS story. Free Engineering Service. Send NOW for your free Catalog.

GITS BROS. MFG. CO.

The Standard For Industry For Almost Half A Century

1870 South Kilbourn Avenue
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Clip this page for handy "rough reference"

Index to

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adjustments. With solenoid control (Illustrated): Style MDS—No. 4685-A. Without solenoid: Style MD.

Style PF—No. 4290.

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Advertisers

and not as part of the advertising contract. Every once will be made for errors or failure to insert.

IF THE TRUTH MUST BE TOLD

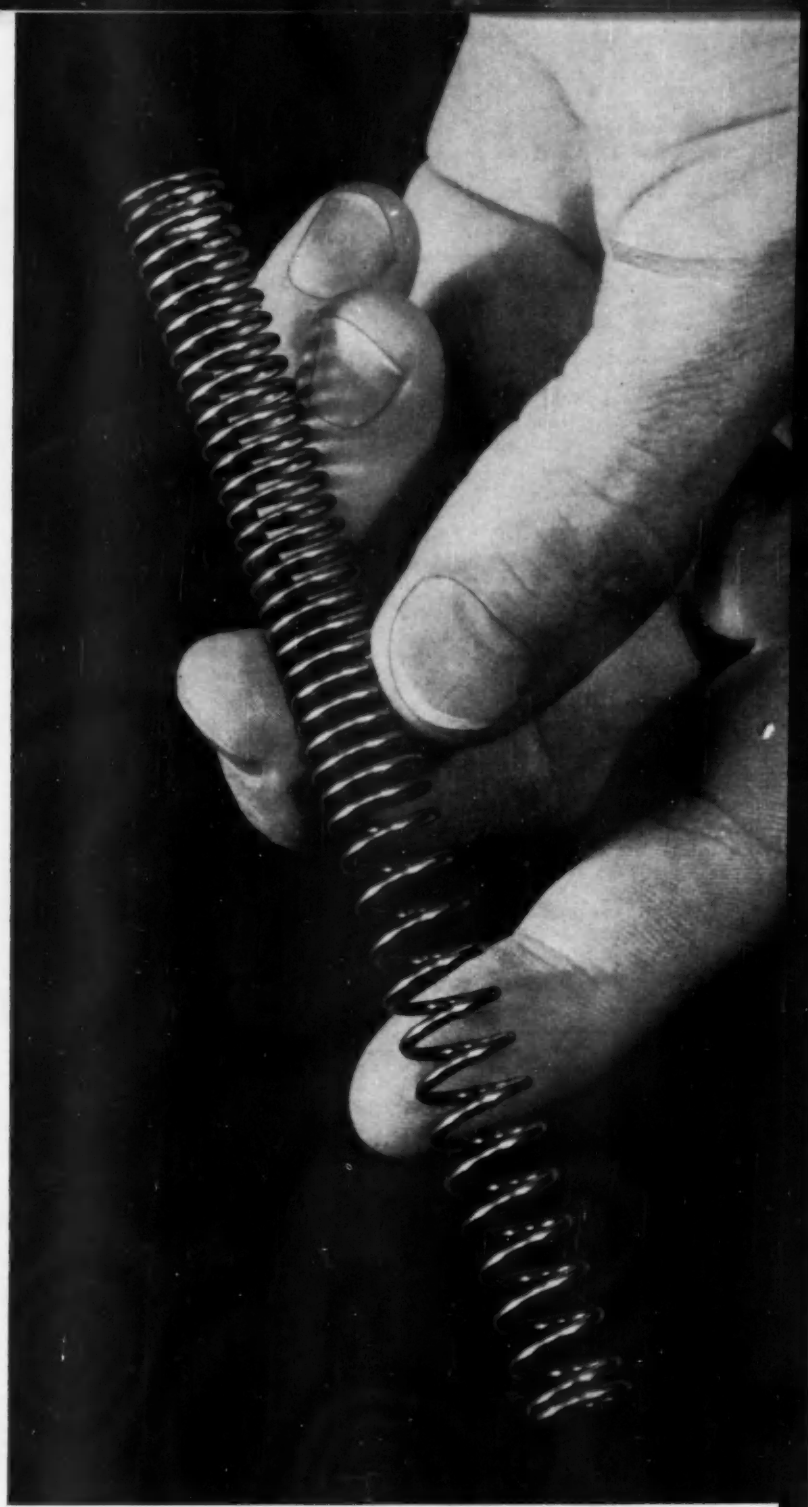
... by a spring

This spring, the dependable heart of a leading make of air pressure gauge, must "tell the truth" years on end. But at first there were tough problems . . . and eventually the manufacturer turned to the Worcester Wire Works Division of National-Standard for a *special spring wire* that would solve them . . .

Look how the spring has a double pitch to properly take and indicate a wide range of pressure loads. Obviously, extreme accuracy, exceptional uniformity, and exact behavior are absolute musts. Rejects were running up to 50 per cent!

That is, until Worcester Wire Works studied the requirements, did developmental work, came up with a specially prepared spring wire and so solved the problems!

Like the other National-Standard divisions, Worcester Wire Works features unusual service that helps other manufacturers turn out better products at lower cost. Try us. You'll see.

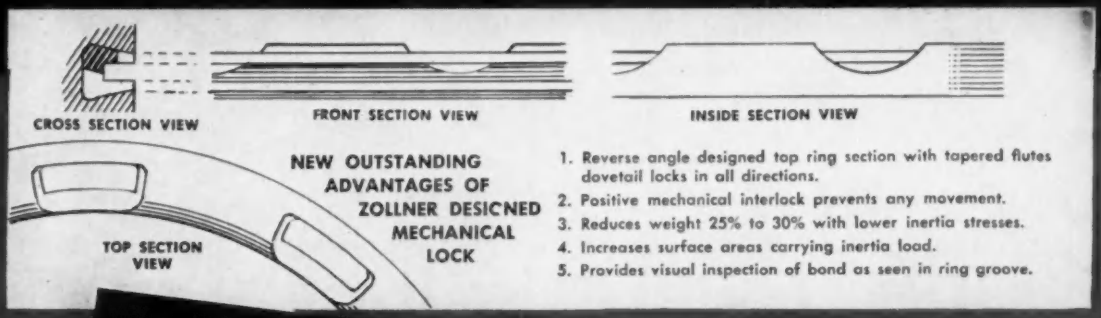


NATIONAL NS NATIONAL-STANDARD **STANDARD**

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *tire wire, stainless, music spring and plated wires* • WORCESTER WIRE WORKS, Worcester, Mass.; *music spring, stainless and plated wires, high and low carbon specialties*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • ATHENIA STEEL, Clifton, N. J.; *flat, high carbon spring steels* • REYNOLDS WIRE, Dixon, Ill.; *industrial wire cloth*

BOND-O-LOC* PISTONS

WITH "NI-RESIST" IRON TOP RING SECTION



1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Double Bonded

METALLURGICALLY Al-Fin Bond

MECHANICALLY Zollner Lock

STOPS!

RING GROOVE WEAR IN HEAVY DUTY SERVICE

"Sensational mileage" is the unanimous report of heavy duty engine builders and transport operators using Zollner "Bond-O-Loc" Pistons. Another great development by Zollner engineers, this super-mileage piston has a "Ni-resist" top ring groove section *permanently* incorporated with the *double* bond of *both* Al-Fin metallurgic *and* the exclusive Zollner mechanical lock. Separation failure is impossible. Ring groove wear problems are eliminated, blow-by prevented, oil consumption minimized, mileage to overhauls greatly increased. We suggest an immediate test of these sensational advantages for your engine.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879

*T. M. Reg. Pat. App. For

ADVANCED ENGINEERING

PRECISION PRODUCTION

COOPERATION with Engine Builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER · Fort Wayne, Indiana

ANNOUNCING!

Increased capacity ratings for Timken® bearings

THE Timken Roller Bearing Company announces an increase in the capacity ratings of most series of Timken® tapered roller bearings. Increases range up to 39%. Most are in the neighborhood of 10%. Some are negligible.

Permits Use of Smaller Bearings

This increase in capacity ratings makes it possible for many of you to use smaller bearings. Your products can be made more compact. You can save weight. You may be able to reduce the size of your shafts and housings. And you may be able to use Timken bearings in new applications where they have not been practicable in the past.

3 Reasons for Increases

What led to these increases in Timken bearing capacities? Three things:

First, a careful review of more than 6,000 different laboratory studies of Timken bearing performance on fatigue life machines. From these exhaustive studies, conducted on an organized, scientific basis since 1924, we keep learning more and more about predicting bearing life.

Second, refinement in the method of analyzing these studies mathematically.

Third, a careful review of the life of millions of Timken bearings in the field.

How Much Can This Save *You?*

To find out how the new capacity ratings affect the types and sizes of Timken bearings in which you are interested, call your Timken bearing representative or write our Engineering Department. We'll be glad to work with you at the drawing board stage. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD